THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., SEPTEMBER 4, 1890.

THE WEEK IN IRON CIRCLES.

General Features. We have to report a decided easing up of the money market, which has been extremely stringent for some time past. It is now generally believed by our best authorities that the chief causes of the recent stringency are likely to abate their violence in the money market for some time to come. The export of gold is not now threatening to reach the dimensions which were predicted, and the manipulation by the "tight money clique," so far as it existed, has received a temporary and wholesome check. The enlarged aggregate of bonds which have been purchased by Secretary Windom tends to give decided relief, not only by adding additional monetary supplies to the floating cash available for bank reserves, but by giving an active impulse to the public confidence, and adding a new stimulus to the movements of capital in the greater channels of the money market. All this will have a salutary effect upon the iron market, and already the signs are plenty of a marked revival all along the line, as the first day of Fall comes in. Most of the Southern furnaces report heavy inquiries for iron—mill grades especially—and large sales at full prices. Agents at the principal distributing centers confirm this, and point to the continuous active consumption, as indicating higher prices in the near future. Vanderbilt furnace, at Birmingham, blew in on the 23d ult., and two DeBardeleben furnaces on the 22d, all helping to swell the output, but still the demand keeps up. Northern stacks are reducing stocks and are indisposed to grant concessions except in rare cases. An active demand for and heavy sales of mill has formed the prominent feature of the Cincinnati pig iron market during the past week. Early sales gave evidence of anxiety to sell "off" grades, but large transactions gave an improved tone to the market and result in higher prices being realized in some instances for Southern grades. It is difficult to duplicate sales of mottled and grey forge made a few days since. There has been a moderate business in foundry grades, and a steady movement in car wheel irons of both Northern and Southern production. Several of the Lake Superior furnaces are well sold ahead on the high grades and are refusing orders of moment at fair prices. The output of the new furnaces which have blown in is being readily absorbed at current market prices. A more confident feeling prevails at the close, and inquiries are numerous. A point of interest is the increased demand for muck bar, outside the regular channels, reflecting the heavy orders placed for finished iron which is reported selling at higher prices. There has been a fair amount of orders entered for pig iron at Louisville during the week, though inquiries have exceeded the offerings. Bar iron has preceded pig iron in price, which is doubtless occasioned by the facilities for the manufacture of bar iron being inadequate to the demand, and this as one feature tends to strengthen pig. Some special brands of coke iron are largely in demand at good prices. Generally there is no improvement in prices but furnaces hold firm. The past week has not shown any large degree of activity at Chicago, but a small run of moderate sized orders have been booked and there is a perceptible increase in the way inquiries, some of the latter for far extended deliveries, indicating a disposition to provide for future requirements on the part of consumers who have not fully covered their needs. Silveries and soft irons are in good demand and some grades of the former are decidedly scarce. Little activity has been noticable in Lake Superior charcoals, but this is explained by the large contracts which have been placed during the last three or four months. On Southern irons the leading furnaces are well supplied with orders and are not pushing for much further business. Foundries are generally well supplied with work, and the outlook for Fall trade continues good, notwithstanding crop shortages in certain directions. In St. Louis inquiry is light, and orders have been taken during the week by the agents of several Southern furnaces (possessing freight advantages) at substantial concessions from quoted values. This unnecessary cutting does not increase the volume of trade; but it does demoralize the buyers. The coke trade continues to improve. Cars were more plenty last week, and shipments went out at a lively rate. It is becoming more apparent every week that a short car supply is the only possible obstruction in the way of booming good coke business this Fall and Winter. The capacity of the Connellsville region is now over 8,000 cars per week.

Iron Ore. In the absence of any noteworthy occurrences in the iron ore market hereabouts, the Gogebic district comes to the rescue with a tremendous sensation which would be of the most far reaching consequences—if there were the slightest foundation for its truth. The story, as it is imparted to the Lake Superior people by a "well posted" man is that the consumers of ore hereaways have formed a gigantic conspiracy with the object, first, to hold down this season's ore shipments and, second, to bear the price for 1891 output. The operation of this conspiracy was to go into effect by the blocking of the lower lake ports in the refusal of the conspirators to accept any ore from the docks, thus robbing the ore ports of their forwarding facilities and relieving themselves at the same time of their obligations incurred for the ore they had ordered, but which, by reason of the blocade, they had not received. Incidentally, this well posted authority remarks, many furnaces went out of blast and the result will be that instead of the shipment of nine million tons this year, the output will fall below seven. Thus runs the story. It is too utterly flimsy and unworthy of notice, yet so very humorous, as to lead to the suspicion that some joker has had his innings with our credulous friends up the lakes and that they swallowed the bait, hook, line and reel. That the lake shipments are showing a loss as to the ratio of increase already gained over last year, is true. But it is likewise true that never in the history of the mining business have carriers had such dispatch at both ends of the route as they had during the first fourteen weeks of this season's navigation. At that period the increase amounted to seven hundred thousand tons. Then came the "Soo" blockade, and while it cannot be denied that for two weeks the bunched fleets had difficulty to find berth room for themselves or dock room for their loads, the delay was no greater than that at present experienced by the same craft in search of ore to bring down. The fact seems to be that in several instances mine owners largely oversold their output, when they were not justified in their proceedings which, without intending recrimination, may be alluded to as being of a purely speculative character. The market has consumed all the ore thus far offered. It could take more, at a reasonable price; and as the season advances the demand increases. It must not be forgotten, however, that last November was a mild month, enabling navigation to be continued during the life of insurance. Should the coming November be cold and stormy, the chances are that a good many vessels will cancel the fag end of their insurance and thus contribute to the cutting down of the ore receipts at the lower lake ports.

Pig Iron. The situation may be summarized in the statement that the demand is good, while prices have remained stationary. The furnaces are still busy on old orders and will be thus engaged for at least six weeks to come. Furnacemen are not disposed to make many concessions and consumers, purchasing largely for spot delivery, are in no position to claim any easements.

THE POETRY OF FREE TRADE.

The New York *Herald* is responsible for a great many vagaries, but its London edition will have much to answer for in stirring up the poetic rhapsodies of various ready rhymsters of John Bull's island, in answering for a guinea prize the question, "What is Free Trade?" The competitive "poems" are not all, as might be expected, in the one line of extolling the beauties of Free Trade, but, with true poetic license, some of the impromptu poets come out squarely in criticism of the much lauded system of Cobden. The effort which won the prize, however, is as orthodox as Cobden himself could desire, and the author, Mr. Wm. Rogers, 10 Alpha Road, Cambridge, may congratulate himself that he has struck the shibboleth of Free Trade to perfection. Here is the prize poem:

What poet can tell in a few measured lines
The history that round this vast subject entwines;
Can sing of the blessings, or wail o'er the woes,
That follow the flag of Free Trade where it goes?

Free Trade is the science that brings to his door
That precious provision—cheap bread for the poor;
It opens up commerce, bids enmity cease,
Uniting the nations, makes straightway for peace.

Though pessimists prate of the danger to trade,
Of industries ruined—the plow and the spade,
Go, put in the balance, deny if you can,
That the blessings outweigh the defects of the plan.

All of which looks well in theory, and reads well in poetry, but a few solid facts from the history of the United States are enough to upset both theory and poetry. How much more forcible is this, from the pen of Mr. R. S. Pengelly, 4 Oakhill street, Halliwell Lane, Manchester, who is evidently not overcome with awe in the presence of the Free Trade god:

Free Trade is but a juggler's trick
To slily "do" your neighbor.
The man who talks about "cheap bread"
More often means "cheap labor."

In order to extend Free Trade
Black niggers must be slaughtered,
And ever in the trader's track
With blood the earth is watered.

At home the craze of cheapness rules,
And—as no mortal men knows better—
If you would learn what Free Trade is,
Why, kindly ask the sweater.

The reference to the famous, or rather infamous "sweating" system of England is really too bad. Does our poet mean to imply that Free Trade is responsible for this stigma upon Christian civilization? Perish the thought. "The craze for cheapness!" What an apt description of the whole scheme of Free Trade.

There is more truth than poetry in this contribution, from Mr. John Owen, 235 Gloucester Road, Bishopston, Bristol. A whole volume of ridicule is contained in the last stanza:

In its proper and liberal sense Free Trade
Is the free interchange between nations
Of all their productions and articles made,
From their wearing apparel to rations.

If Jonathan, Louis, and the civilized crew,
Would stick to the saying old,
"As you wish to be done by, that you must do,"
John Bull would rake in the gold.

Free Trade, in its present and stunted sense,
Which certainly raises my gall,
Means that Johnny must take the silver and pence,
But the gold he shall not touch at all.

Mr. C. H. Iswick Parker, 10 Bolton Road, Grove Park, Chiswick, has trained his Pegasus to keep step to the music of Free Trade, as the following will show:

In times of small profits, when all is dejection,
The 'cute man of business screams out for Protection,
And cries, when he's asked how 'twould cure the dread evil,
"My trade must be nursed, yours may go to the devil.

"If you, foreign statesman, all heedless of crises,
Charge duty on our goods and put up our prices,
Our course is quite plain; to place *us* on all fours,
We'll make our own people pay too much for yours!"

But we, as Free Traders, want none of your taxes,
We'll leave them to you, who are grinding your axes,
For while *duty-bound* to be just to a penny
To be *duty-free* is just life to the many.

To Mr. S. Charteris, South Place, Surbiton Hill, the coming in of universal Free Trade is in the dim and distant future. Hear him:

"Thus different good by art or nature given
To different nations make their blessings even."
So Goldsmith wrote, and though but partly true,
'Twere wholly so, did nations keep in view
That members of one family they are,
And should their blessings with each other share;
Nor tax the product of foreign land,
To seek redress denied at nature's hand.
Redress they have, each in its clime and soil,
And natural aptitude for various toil,
When free exchange of product shall have laid
Protection's ghost and ushered in Free Trade.

To this might be added:

But when we come to bury the tariff hosts,
We find Protection is the liveliest of ghosts.

What to the foregoing poet appeared dim and distant, to Mr. H. S. Walter, 106 Elmore street, Essex Road, N., London, quite disappears from the horizon of possibility. He writes:

Alas, 'tis the fabled Argosy,
Laden with golden grain,
Which *some* still yearn and wait for,
But yearn and wait in vain.

For Creeds and Races still bar the way
That the noble barque must steer,
For grasping Self and sordid Wealth
Prevent her approaching near.

And when at length the good ship sails
O'er the calm and peaceful deep,
You and I and all the world
Will be resting in final sleep.

There is an unmistakable tendency in the contribution of Mr. W. D. Livesey to sneer at the practical operations of Free Trade in Great Britain. Here is what he says:

Free trade is not an easy thing
To state in lines poetical;
Some say the good it can bring
Is mainly theoretical.

When too one-sided, they declare
It's simply an atrocity;
And praise the Trade by some called "Fair,"
By others "Reciprocity."

To let our neighbors' goods in free
While they impose taxation
On ours, is called, it seems to me,
"Free Trade" by this free nation.

Even machine poetry will show which way the wind blows, and we venture to say that the Prize Editor himself must see the force of that last stanza. Indeed, it appears very strange that, of the seven poems printed, at least four are on the off side of Free Trade—which goes to show that even poets are possessed of considerable common sense. In view of the foregoing, we would suggest that the *Herald's* London editor file away the above poetic gems, with this endorsement:

Instead of showing up Free Trade at its best,
The Prize Editor stirred up a hornets' nest.

TWO WORDS WITH TWO CONTEMPORARIES.

We are glad to observe that our friend, the Chattanooga *Tradesman*, as quoted elsewhere, has gracefully gotten one leg over, preparatory to dismounting from its high horse, and now only claims, what *The Iron Trade Review* cheerfully conceded from the start, that the iron development of the South during the past twenty years has been such as to challenge the admiration of the world; and we now repeat it. What we have been trying to make our contemporary see and acknowledge is that an increase of 100 per cent. in pig iron production during the past ten years, on the part of the Central Western group of States, which had already attained so strong a position as to render comparison by percentages difficult, is something quite as deserving the attention of the commercial world. All the rest of the world can see this. The *Tradesman* can't. That's all.

Another valued contemporary, the Marquette (Mich.) *Mining Journal*, in discussing the probable output of the Lake Superior iron mining regions, as shown in another column, admits that *The Iron Trade Review* was right, and the Lake Superior journals were wrong, in the predictions for the present year, but says that the fault is not with the mines but with the railroads at the lower lake ports, by reason of the inadequate handling facilities. That is all right, but it was the fact, not the cause, that we have been discussing, and we are glad to see such good authorities as the *Iron Age* and the Marquette *Mining Journal* endorsing our position.

AS TO MANIPULATING THE IRON MARKETS.

Some time since, in opposing the introduction of the English system of pig iron speculation into this country, we casually remarked, simply as a statement of fact, and nothing more, that the only furnaces that had taken hold of the storage warrant scheme to any extent were those in the South. At this the Chattanooga *Tradesman*, ever alert to discover or imagine adverse criticism of its section, without denying the fact undertook to defend the scheme itself. We are pleased now to observe that it has returned to its accustomed good sense and that it condemns warrant speculation in no uncertain words. Replying to some remarks of the *Wall Street News*, regarding the desirability of speculation in pig iron warrants, our Chattanooga contemporary well says:

If there was no such thing as morality in business the *News* would be measurably right; but taking the cold matter of loss and gain and the way it is viewed by loser and gainer, and the argument is still illogical, absurd, inconclusive. The feelings of men when they are making money by speculation does no more prove the speculation a legitimate one than does the coveting of a neighbor's purse justify the thief who "lifts" it. Besides, the *News* attributes too much to the power of speculative craze pure and simple. The boom in the English iron market in 1888 89 started from a strictly legitimate but almost unprecedented demand. By taking this rising tide at the flood the speculators, by the usual gambling devices of cornering, combining, etc., pushed it away beyond its natural height. This broke the market in a few months whereas it would have gone along in a healthy way at high prices for a year or two had it been let alone, not stimulated by unnatural means. The speculative craze caused over production. When the collapse came the ironmasters found themselves loaded up with iron made at much higher than normal cost, the increase in cost being brought about by the gambling. It is doubtful whether in the long run the masters made a fair profit if the boom season and the depressed season following are taken into account. The talk

to the effect that dealing in futures helps the producer is utterly fallacious when tried by all the facts or tested by sound economic principles. Demand and supply fix prices in the long run. Boom-prices tend to reduce demand and increase supply, and are therefore against the honest producer.

This is all we ever contended for. It was against the introduction of this same system of gambling devices into the American iron markets that we objected, and continue to object. The *Tradesman* was wrong when it defended the New York metal manipulators; it is right in drawing healthful lessons from the experiences of English ironmasters. We take pleasure in recording this praiseworthy change of front.

CANALS AND CHEAP MATERIAL.

For the benefit of those gentlemen who see great benefits to the iron trade of Western Pennsylvania in the construction of a ship canal between Pittsburgh and Lake Erie, we call attention to the recent visit of inspection made by a party of prominent English ironmasters to the new Manchester Ship Canal. Any one familiar with the location of the coal and iron districts of Great Britain will be interested in learning that, by the construction of the canal, the coal basin at Partington will be nearer the South Yorkshire coalfields than the port of Hull—a point of some significance to the ironmasters of that district. Mr. Marshall Stevens stated that the carriage of pig iron by rail direct from the west of Scotland to-day cost no less than 12s. per ton, but in order to effect a saving on that amount makers sent the iron by sea to Fleetwood, Morecambe, Garston and Runcorn, the rates from these ports to Manchester being from 4s. 4d. to 5s. 6d. per ton. The same freight which the ironmasters of Scotland paid to any of these ports would bring a vessel through to Manchester on the Ship Canal. In the case of South Wales, the Ebbw Vale Company paid 10s. 6d. a ton rail rate to Manchester, whilst their rate to Newport was only about 1s. 6d. a ton. In this instance the canal would enable this and other companies to send goods through to Manchester at a total freight charge of only 5s. per ton. With regard to South Staffordshire, traders there were unable to use canals for export traffic to any great extent, because the barges plying upon the English canals could not pass the estuary of the Mersey. As a consequence the whole traffic had to be transhipped at Runcorn, Preston Brook or Ellesmere Port. When the Ship Canal was in operation these narrow boats would be able to deliver alongside ships at any part of it, and thus at least one-half the cost of carriage would be saved.

There is no question that the people of Manchester have shown the greatest wisdom in projecting and successfully carrying through this great work, thus making of their city a seaport of the first class. Nor has their example been without effect, for we observe that the municipal engineer of Paris has submitted plans to his Government for the construction of a ship canal from Paris to the sea. It may be that the construction of the Pittsburgh and Lake Erie Ship Canal is not so far in the future as many suppose.

ESTEEMED CONTEMPORARIES.

THE SOUTHERN AND CENTRAL WESTERN IRON DISTRICTS.

The editor of *The Iron Trade Review*, of Cleveland, O., is pleased to specify some remarks we made about what we regarded as his effort to belittle Southern development, as "ungracious." Well, we have no feeling about the matter at all. We think it ungracious and absurd to compare the oldest and richest iron and coal region in America, with one that has been worked but twenty years. If the region that began in 1810, is not ahead of the one that began in 1868, it would prove the older a very inferior district in both supplies and energy. All we have ever contended for in this connection is that no part of the world has shown such growth of its iron and other industries as the South has developed in the last twenty years. That is the point. In two decades the product of pig iron has risen in the Southern iron district from 100,000 tons a year to 1,500,000 tons. When the *Review* can equal this in the history of the iron trade we will surrender the topic, and promise never to again mention it.—[Tradesman, Chattanooga, Tenn.

THIS YEAR'S ORE OUTPUT.

Discussing the probable ore output for 1890 does not seem to the *Mining Journal* a profitable way of using time and space, but the iron trade publications will persist in doing it, nevertheless. *The Iron Trade Review* quotes the *Iron Age* to the effect that the mines will not place as much ore on the market this year as they did in 1889, and adds by way of comment: "We do not agree with the *Iron Age* in its forecast, believing that the 1890 shipments will somewhat exceed those of the preceding season; but we merely cite the New York paper's opinion to demonstrate to our friends up the lakes that the knowledge of the ore situation is by no manner of means confined to Lake Superior shipping ports." This is a rap by the *Review* at the papers in this region which have criticised its, at times, somewhat sensational reports on the situation in the ore trade, but the *Mining Journal* is content to let it pass. It may be that the output for 1890 will not reach, or will only very slightly exceed, that of 1889, but if that should happen it will be largely due to the insufficient dockage facilities at the receiving ports, and not at all to the mines, which are quite able to furnish all the ore the market may need, this year or next. That the output this year will be considerably below what it would be but for the inability of the receiving ports to care for it properly is probable, and the fact will not be at all creditable to the towns on the lower lakes which have been so greatly benefited by a traffic for which they have not provided adequate facilities—the *Review's* own Cleveland among these.—[Marquette (Mich.) Mining Journal.

THE MOLOCH OF THE PENNSYLVANIA IRON INDUSTRIES.

Last week we presented a table of figures of which were collected by Labor Commissioner Wright, showing in a striking manner the difference in cost between a ton of pig iron produced in the North as compared with the South. Northern producers of pig iron and the journals which represent them take pains to point out that the extra cost in the North is in a great measure the result of the excessive charges made by the railroad companies for transporting the raw material to the blast furnaces. "In many cases," says *The Iron Trade Review*, a well-informed Cleveland journal, "the rate in the North is twice that charged for the same distance in the South;" and again "the railroads of the North (especially of Pennsylvania) are sapping the life out of the iron industry." There is, no doubt, a great deal of truth in both these assertions. The Pennsylvania Railroad Co. is, and always has been, a *bete noire* in the State, a monumental example of the proverbial soulless corporation knowing no interests save its own and not at all particular as to the methods employed to swell its receipts. A Moloch which has made itself great from the development of the iron and coal interests of the State until it practically controls the legislature and dictates its laws, it shows its gratitude by placing harassing burdens upon the very industries to which it owes its power and by the arrogance with which its management treats protests against its injustice. But, however censurable this corporation may be for its short-sighted policy, we do not believe that a lowering of freight rates, even to the level of the Southern figures, will close up the gap and bring North and South upon a level in the matter of cost of a ton of crude iron. Nobody knows this fact better than the Northern furnace men themselves, as is evident by their attempts to induce the railroad company, from whose exactions they suffer, to raise the rates upon the product of the Southern furnaces which comes into competition with the output of their own furnaces.—[American Artisan, Chicago.

Why We Have No Ships—The Whole Question in a Nutshell.

The disadvantages against which American vessels in the foreign trade have to contend are fourfold:

First.—Liberal postal and naval subsidies, and building and sailing bounties paid by chief shipping nations.

Second.—Lower wages to mechanics in foreign shipyards, machine shops and dry docks, and lower wages to officers and seamen, and lower cost of maintenance on shipboard.

Third.—Hostile discrimination of British Lloyds in respect to inspection and classification, and of English underwriters in regard to the insurance of cargoes in American-built ships, compelling vessels under our flag to wait longest for charters and to receive always the lowest rates of freight.

Fourth.—Competition of the severest kind with all the shipping of the world, in consequence of the free shipping policy of our government since 1828, and no attention given by Congress nor any action taken to secure equal footing and fair play to our shipping under the unequal and destructive competition which it has invited, and which has subordinated our shipping service to the will and caprice of our rivals and enemies, driven our people and our flag from the high seas and crippled our right arm of national defence.

Though the policy mentioned in the fourth section was adopted in 1828, its operation was confined to the smaller maritime powers until 1850. The extension of the provision of this act to Great Britain at the commencement of that year is the cause of our loss of maritime position.—[American Economist.

A New Steam Boiler Tube.

Messrs. John Brown & Co., Limited, of the Atlas Works, Sheffield, England, having recently undertaken the manufacture in Great Britain of a new kind of steam boiler tube known as the "Serve patent ribbed tube," the directors are now engaged in putting down two marine boilers 10 ft. 6 in. in diameter by 10 ft. 6 in. long, one with ordinary plain tubes and the other with the Serve tubes, in order to show to marine engineers that the new tubes can be worked without inconvenience, as well as give a very much greater steam evaporation, for which the tube is designed. It is expected that in the course of about a month the boilers will be in operation, and the results are being awaited with interest by marine engineers. If they are satisfactory as expected and as similar trials have been in France, their manufacture will add another not unimportant industry to Sheffield.

REAR-ADMIRAL DANIEL AMMEN, one of the chief promoters of the Nicaragua Canal scheme, contributes an interesting article to the September *Lippincott*, which gives a history of the inception of the project and the progress made up to date, and indicates the great results which will accrue from the construction of the canal. The failure of the Panama Canal scheme has turned the eyes of the world upon Nicaragua. An important and timely article upon "Current Concentration of Industrial Capital" is contributed by Henry Clews. He inveighs in strong terms against the present "trusts" and "combines," and predicts their speedy downfall. He holds, however, that some form of combination is necessary to all large enterprises, and that existing state laws relating to corporate enterprises need but to be broadened in their scope, and more strictly defined in respect to their safeguards, in order to keep all combinations within proper bounds.

LAKE ERIE PORTS: THEIR COAL & IRON ORE HANDLING FACILITIES

VIII—SANDUSKY.

The Baltimore & Ohio Railroad and the Cincinnati, Sandusky & Cleveland road handle the coal and ore traffic of Sandusky, both roads having ample dockage front extending into Sandusky bay. The United States Government is at present at work upon the old channel beyond Cedar Point, widening and deepening it, and the contemplated improvements are the cutting of a straight channel from the Eastern dock frontage to Cedar Point, having a width of 200 feet by 17 feet deep. The present indirect channel between these points is only 150 feet wide by 16 feet in depth. The straightening of this course will be a very important improvement, such as is needed by Sandusky's growing lake commerce.

The ore receipts at this port the last four years have been as follows, viz.:

	1886.	1887.	1888.	1889.
Gross tons.....	157 970	160,600	154,924	186,082

The ore cargoes received for July, 1890, were 40,747 tons while the coal shipments for the same time were 39,910 tons, and the shipments for 1889 reached a total of over 300,000 tons.

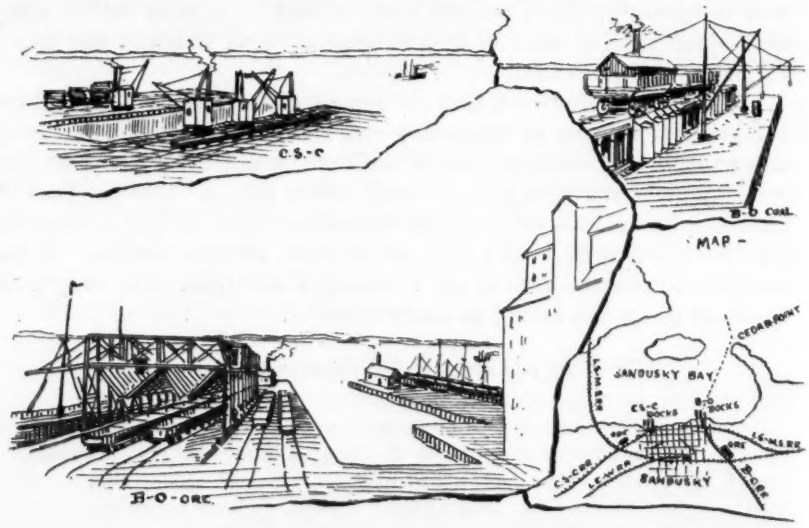
Mr. John J. Finch is the collector of this port. According to Custom House statistics there hailed from Sandusky 101 vessels having an aggregate tonnage of 16,667 on June 30, 1874. The pioneer railroad from the central part of the State was the old "Mad River and Lake Erie Railroad," which is now known as the Cincinnati, Sandusky & Cleveland Railroad. This line was projected in 1826, but was not commenced until September 7, 1835. Horses formed the means of locomotion and the rails were of wood covered with an iron strap, which gave the foundation for calling these early veins of intercommunication "strap roads." It was not until 1845 that the equine steed was superseded by the iron horse. This event, according to the "History of Erie County," occurred on the Sandusky, Mansfield & Newark Railroad, now known as the Baltimore & Ohio, Lake Erie Division. This road commenced operations in 1837.

The Cincinnati, Sandusky & Cleveland docks and general offices are located four blocks west of Columbus avenue, at the foot of Lawrence street. While those of the Baltimore & Ohio are four blocks east of Columbus avenue, at the foot of Warren street. The Baltimore & Ohio operate two docks, one for ore and the other in their coal business. Their ore dock is west of the coal-handling facilities, both, however, fronting on slips, extending in from the bay. The ore dock is 764 long by 65 feet wide, upon which no ore is stored, this probably being the only Lake Erie dock not used for storage. They have room for two vessels at one time, and the dumping from the buckets is direct into large dump cars for transferring to their storage trestles located one and one-half miles from the dock, near the Lake Shore & Michigan Southern Railroad crossing. These trestles afford storage for 115,000 tons of ore. In 1889 they received 175,000 tons of ore, and in 1888, 154,645 tons. The ore trade has been developed mostly within the last six or seven years.

Their unloading facilities are dissimilar from most others on the lake, in that the overhead truss work extends only over two tracks and the boom projecting over the hatch of the vessel, slides upon the truss work, at right angles to the dock instead of having its heel pivoted in the forward mast of the truss and adapted to swing up when not in use as other devices do. They claim increased facilities in handling ore by reason of the style of hoists that they employ. They in the main, embody ideas of construction and operation of a former master mechanic of the Baltimore & Ohio Road. In their operation there is used a stationary engine house, furnishing power for all the individual hoists through a main shaft that runs parallel with the dock front. Each hoist is connected to the main shaft by a series of friction pulleys, one on the shaft being splined thereon, which allows of its being moved endwise on the shaft as the whole truss is moved alongside of a vessel to accommodate itself to the location of the hatch to be worked. The buckets dump automatically into chutes leading to the cars underneath, they are not lowered, hence considerable time is saved in making a round trip. The chutes break the fall of the ore as it leave the buckets. There is, of course, one operator to each hoist, but they are distinctly independent of each other, and each one can move its buckets without disturbing any of the others.

The Baltimore & Ohio Co.'s coal slip is a little to the east of their ore plant, and it consists of about 700 feet frontage by a width of some 47 feet. Here are employed two mast and swinging boom hoists which carry the large buckets of coal to the vessel moored alongside. The track upon which the railroad cars—which are of the side dump order—are brought to the dock is raised upon a trestle, and upon each of its sides, below the dock level, are parallel tracks of small guage, which are provided with four tram cars, each one being as long as the large railroad cars. These tram cars have a staging adapted to hold six large buckets. The staging, between the buckets and the trestle, extends up to about the level of the cars, at which point there are placed semi-circular hoppers into which the buckets fit snugly. As the sides of the railroad car are opened, the coal falls into the buckets, being subdivided by the hoppers. Twelve buckets hold the contents of a car and this number constitutes a set which accompanies one mast and boom hoist. A large overhead sprinkler is used to moisten the coal on the large cars and thus obviate the usual dust attending the transferring of coal shipments. These facilities enable them to handle 1,800 tons daily. They shipped 265,000 tons during last year. Both the coal and ore docks are under the efficient management of Mr. B. A. Galleher, the company's agent, to whom we are indebted for many courtesies.

The Cincinnati, Sandusky & Cleveland Railroad Co, under the efficient management of General Manager J L. Moore, have for years maintained coal-shipping docks at this port. They have, within the last year or two, gone into the ore traffic, especially so in the last year. Their docks are used interchangeably for both branches of the business. Some ore has been stored upon the dock, about 7,500 tons, but subsequent handlings, when their large



storage trestles, one-half mile from the docks, are completed, will be direct to dump cars and thence to the storage space. These trestles are contemplated to store 100,000 tons of ore. They use three derricks in the ore business and one additional one exclusively in the coal handlings; however, all four are at times used to load coal cargoes. Their docks have a frontage upon a slip extending in from Sandusky bay of 550 feet long by 125 feet wide, devoted more especially to ore handling, while in the coal traffic they have 470 feet of length by 60 of width, upon which they can handle 2,000 tons of coal daily. Their ore dock is of recent construction and its facilities will soon be largely increased. The frontage of Sandusky devoted to the ore business reaches 1,314 feet, having machinery for 13 hatches and storage room for 215,000 tons of ore. The coal business has a frontage of 1,177 feet, accommodating six hatches and having a daily handling capacity of 3,800 tons of coal for lake shipments.

Iron as a Filtering Material.

A process of manufacture of filtering material is described as consisting essentially in reducing ferric oxide by heating it in contact with gaseous fuel. Small pieces of iron ore, perfectly hematite, are packed into a retort heated externally, preferably by producer gas. When the charge is at a cherry red heat, gaseous fuel is admitted into the retort and brought into thorough contact with the ore. At the end of four or five hours, if the exit gas be inflammable, the process is finished, and the charge raked out and allowed to cool. Ordinary coal gas or other gaseous fuel may be used instead of producer gas. The magnetic oxide so produced is available for filtering water, sewage, sugar syrups, alcoholic liquors, etc.

SOME INTERESTING DISTANCE STATISTICS.

The remark is very trite that raw materials of manufacture are hauled enormous distances in this country. Everybody is familiar with this statement. In some of the most prominent manufacturing districts the item of freight in assembling raw materials is the most important element to deal with. Other costs are worked down by prudent management and systematic methods to a level with those obtaining in other sections, but in the matter of freights a set of circumstances comes into play which cannot be governed by those most interested in or affecetd by them. It is rare, however, to meet with a table of distances for any particular locality which will show its exact situation with reference to its supply of raw materials. Having recently had occasion to make some inquiry into the conditions affecting the trade of Chicago, some facts were obtained on this point which may be of interest to our readers, all of whom are aware of the rapidity with which manufacturing enterprises are growing in the vicinity of that city.

The longest all-rail haul of Lake Superior iron ore to Chicago blast furnaces is from the Vermilion range mines in Minnesota. The distance is 690 miles. Only a limited quantity of ore has taken that route, but the practicability of Winter haulage has been demonstrated. The distance by lake and rail combined from the Minnesota mines to Chicago is about 1,020 miles, of which 70 miles comprises the rail haul to Two Harbors, and the remaining distance covers the lake haul across Lake Superior, through the Sault Ste. Marie and the Straits of Mackinac, and up Lake Michigan to Chicago. The Gogebic mines, in Northern Wisconsin and Michigan, whose shipping point is Ashland, on Lake Superior, are 939 miles from Chicago by rail and lake, but by all rail they are much nearer, say 400 miles in round numbers. The mines of the Marquette range, in Northern Michigan, whose shipping port is Marquette, are about 635 miles from Chicago by lake and rail, the rail haul to the port of Marquette running about 25 miles. The all-rail route to Chicago would only be about 400 miles, or the same distance as from the Gogebic mines. The Menominee range mines are situated nearer to Chicago than the mines of the other Lake Superior districts being only about 375 miles by rail and lake. Of this distance 75 miles covers the rail haul from the mines to Escanaba, on Lake Michigan. By the all-rail route the distance to Chicago would be about 360 miles. All these figures seem formidable, but lake freight rates are remarkably low for the distance covered, and rail rates are also very reasonable, on account of water competition, as well as competition between several lines of railroad traversing this section.

Coming next to coke, another set of long distance figures is encountered. Coke is hauled to Chicago entirely by rail. It is drawn from several sources of supply—namely, the Connellsville and Reynoldsville regions in Pennsylvania and northern and southern districts of West Virginia. The shortest haul is from the Connellsville region, say 525 miles. The Reynoldsville, or Rochester and Pittsburgh, coke district is easily 625 miles from Chicago. The northern coke region of West Virginia is about 535 miles, and the southern district about 600 miles. A new coke region is being opened up in Southwestern Kentucky, about 525 miles from Chicago, or practically as close as the Connellsville region.

Anthracite coal from Pennsylvania is consumed in considerable quantities in Chicago, but not for manufacturing purposes. The usual route it takes is by rail from the mines to Buffalo, say 325 miles, and by lake thence to Chicago, say 900 miles. The bituminous coal used by manufacturers is obtained to a slight extent from Western Pennsylvania, to a greater extent from Ohio and Indiana, but principally from the coal fields of Illinois. When drawn from Western Pennsylvania it is hauled by rail at least 500 miles; when obtained from Ohio it is transported from 300 to 375 miles, and from Indiana about 175 miles. The coal fields of Illinois are only 50 to 75 miles from Chicago. Crude oil is now an important raw material to numerous Chicago manufacturers, who use it for fuel. The principal source of supply is the Lima district, in Ohio, whence a pipe line 200 miles long runs to the southern part of the city.

These figures are not given as absolute distances, but are approximately correct, inasmuch as the various districts tapped are themselves of large extent. They serve to show, however, that the manufacturers of Chicago have had to conquer formidable disadvantages in establishing their various enterprises. How well they have succeeded is known to the world. Notwithstanding their remoteness from essential raw materials, they have had countervailing advantages which have enabled them to build up enormous plants, with possibilities of great future growth.—[Iron Age.

A New Tariff Rate in Africa.

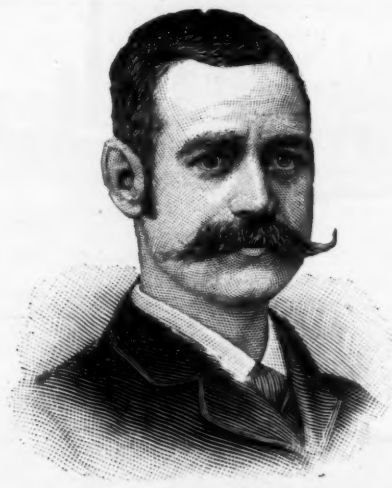
According to the new tariff law some very heavy rates will in future be paid upon certain classes of goods imported into the South African Republic. Every gun or pistol will pay 10 shillings per barrel—a duty which must in many cases considerably exceed the first cost of the weapons. Copper wire is taxed to the extent of sixpence per pound, cartridges five shillings per thousand, gunpowder and lead sixpence per pound, and shot threepence. Only a small duty—1½ per cent.—is paid on machinery, and working tools and manual appliances are admitted free in the case of persons settling in the State. Caffir picks, of which Sheffield and Birmingham furnish a considerable supply, will each pay a duty of 1 shilling.—[Hardware.

Metals in Japan.

The import business in metals in Japan during the past year, says an official report, was, as a rule, satisfactory. The demand for nail rods has for some years been decreasing, whilst nails show each year a larger business, but 1889 was an exception, the transactions in nail rods having somewhat increased, while those in nails have fallen off. This is, perhaps, to be accounted for by the fact that the price of nail rods has declined, while that of nails has advanced. Iron bars, nails and sheets, increased. Pig iron showed a very serious falling off—viz: over 40 per cent. This is partly due to large stocks being left over the previous year, and probably also to the Japanese using up old stocks of scrap iron, etc., instead of buying pig at a comparatively high price. Galvanized iron continued to increase in importance, being more in demand for roofing and similar purposes. The year, however, closed with heavy stocks, for which there was but little sale. The deliveries in 1889 of tinplates were 7,050 boxes, as compared with 5,160 in the previous year. This is the first time for some years that there has been an increase, owing, probably, to a larger quantity being required for canning goods, for which old kerosene tins are unsuited. Hitherto the rule has been that, while the consumption of petroleum increased, business in tinplates fell off, as old kerosene tins proved an excellent substitute. Generally the prospects of the present season are good—[Industries.

A PRACTICAL SAW-MAKER.

The accompanying portrait will be recognized as being that of one of America's best saw-makers, Mr. E. B. Radcliff, of Radcliff, Rowe & Co., Cincinnati, O. This concern succeeded to the business of J. P. Hogan in 1878, and its history has been one of rapid progress ever since. The secret of this phenomenal growth lies in the fact that the members of the firm are practical saw-makers, and have combined in all their productions that amount of skill and intelligence necessary to the making of a "perfect saw." Mr. Radcliff has spent his entire life in the saw shop and has made a special study of large circular saws as to speed and tension, and no work leaves the factory until it has been thoroughly inspected and tested by him. Mr. Rowe, during his



MR. E. B. RADCLIFF, OF CINCINNATI, OHIO.

thirty-one years' experience as a saw-maker, has made a special study of tempering, and has now become a past master in the art. A thorough knowledge of these two subjects regarding the quality and perfection of a saw enables them to produce the best of work, and on the strength of this they have built up an extensive trade in the yellow pine regions, where a saw requires a very tough temper. Messss. Radcliff, Rowe & Co. use their own special English steel, which is imported direct, and by their new mode of tempering are enabled to turn out saws of uniform quality and superior workmanship.

An Immense Structural Iron Plant.

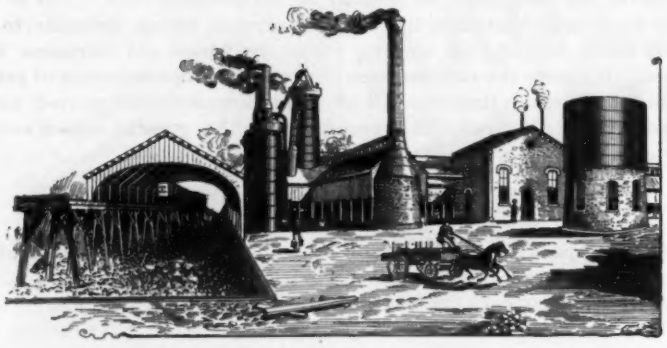
It is announced that Parkes & York, iron brokers, have organized a company capitalized at $5,000,000 for the manufacture of structural iron to be used in buildings, bridges, ships, etc. It was given out that the plant would be made at South Chicago and probably close to the Illinois Steel Co.'s works. Later, however, it was said that the Stickney Co. had offered fair inducements to the company to place its factory there. Mr. York's patents for the rolling beams, etc., will be applied in this factory. Contractors and others interested in iron buildings are prepared to welcome such an enterprise, they having suffered great annoyance from delays in the filling of their orders. Although of very recent growth, the demand for this kind of iron, or steel, rather, is enormous. The quantity needed for such a building, say, as the Leiter, in Chicago would be equal to half a hundred miles of rails for a railroad. Architects and owners have passed favorable criticism upon steel structures, and it is believed the demand will increase. The prediction is made that structural iron will soon be used in smaller buildings, as residences, flats, etc. The principal stockholders of this company are said to be from Pittsburgh and the plant is promised at once. Parkes & York will superintend the erection of the buildings and machinery.

Ocean Racing.

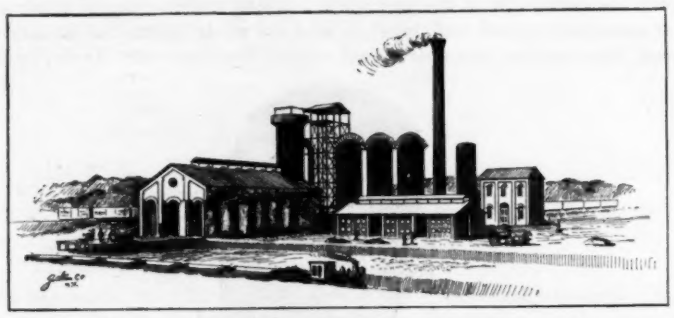
The recent race, for it can be called nothing else, between the Teutonic and the City of New York, while interesting and exciting to those on land, and to quite a number of passengers on board the steamers, caused a great deal of uneasiness in the minds of other passengers. One of the passengers of the City of New York, writing to the Buffalo *Express*, says that the run was undoubtedly exciting, "but it was scarcely calculated to allay the fear, or rather certainty, that care, caution and good judgment are entirely secondary to the spirit of the sailors' motto, to wit: 'Hell or New York in five days.'" For his part he "prefers to arrive in New York safely in seven days than otherwise in five days."—[Railway Review.

NORTHERN machine builders have recently received heavy orders from the South for all kinds of cotton machinery. The bulk of the machinery used is of American make, and the Southern States are at present great factors in the development of the machine industry of New England.

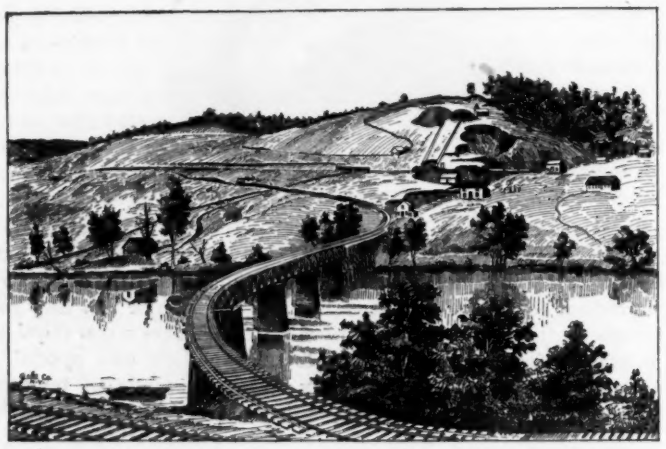
THE IRON TOWNS AND INDUSTRIES OF VIRGINIA.



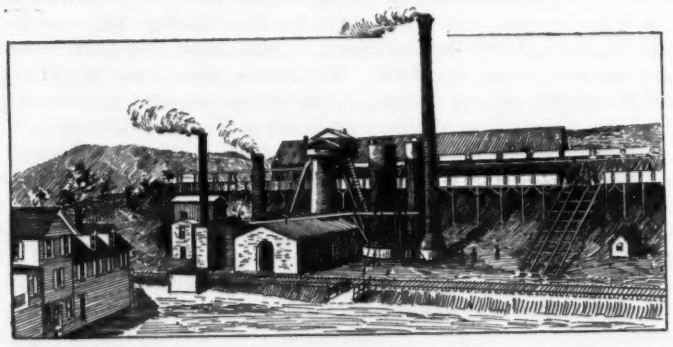
FURNACE OF THE ROANOKE IRON CO., ROANOKE, VA.



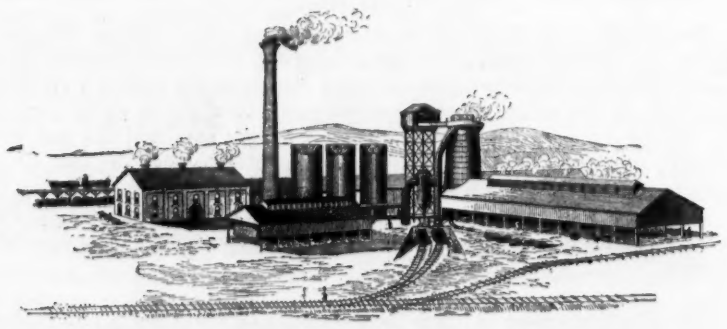
FURNACE OF THE SALEM FURNACE CO., SALEM, VA.



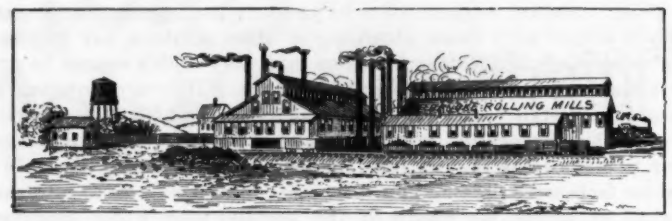
ORE MINES OF THE HEMATITE IRON CO., FOSTER FALLS, VA.



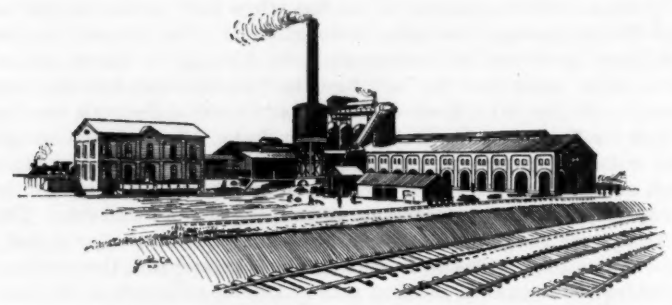
IVANHOE FURNACE OF THE NEW RIVER MINERAL CO., IVANHOE, VA.



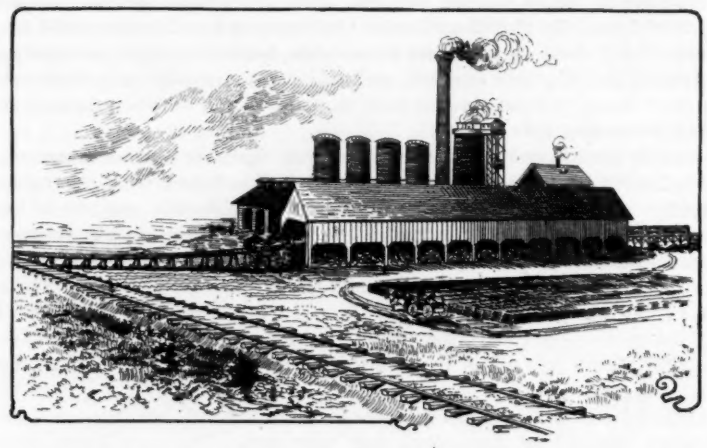
FURNACE OF THE GRAHAM FURNACE CO., GRAHAM, VA.



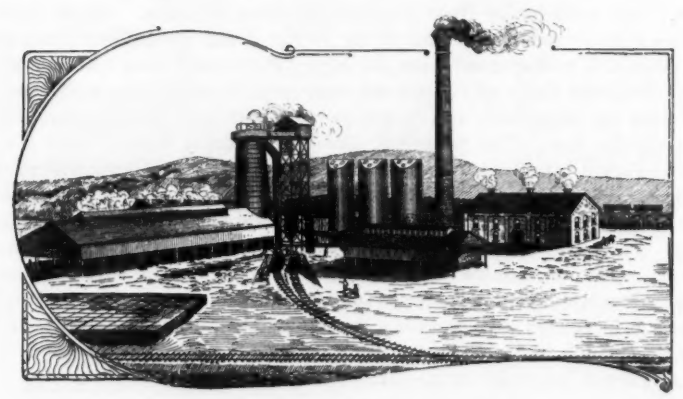
WORKS OF THE ROANOKE ROLLING MILL CO., ROANOKE, VA.



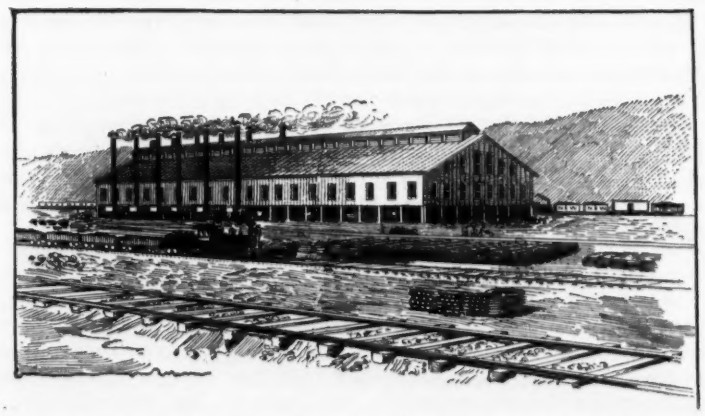
FURNACE OF THE PULASKI IRON CO., PULASKI, VA.



FURNACE OF THE MAX MEADOWS FURNACE CO., MAX MEADOWS, VA.



FURNACE OF THE BRISTOL FURNACE CO., BRISTOL, VA.



WORKS OF THE RICHLANDS ROLLING MILL CO., RICHLANDS, VA.

THE IRON TOWNS AND INDUSTRIES OF VIRGINIA.

On this and the opposite page we present views of some of the leading iron works of Virginia, as well as of coal mines and coking works, the cuts being kindly furnished by the Norfolk & Western Railroad Co. Among the prominent and promising iron centers we notice, first, the city of Roanoke. But six years ago Roanoke was a small but hopeful station, best known from the location of the railroad machine shops, the general office buildings of the Norfolk & Western and Shenandoah Valley Railroad companies. The population was then less than 1,000 souls. It is thought that the local census of the present year will show the number of 20,000 persons. A large proportion of the male population is employed in the machine works, the three iron furnaces, rolling mill, bridge works and the carriage works. The canning factory, planing mills, tobacco works, ice factory, brick works and other numerous minor interests, with the endless building and grading operations, afford plenty of work for all comers.

Salem, another flourishing town, being in the heart of the iron district, a new furnace has been erected, with a capacity of over 100 tons of pig iron per day, and drawing its ore supply from its own mine but a few miles away. In planning the new extension an ample space has been left for steel and iron industries, of which Salem will, in due time, have its full quota. A foundry and machine shop are now in full operation.

Pulaski is another attractive place. The Pulaski Iron Co.'s plant is to the eastward and the Bertha Zinc Works to the westward of the town; a narrow gauge railroad extends from the latter to Altoona, eight miles distant. A rolling mill to manufacture bar and sheet iron is being constructed. An additional iron furnace is now being erected.

Foster Falls, Wythe county, is 24 miles from Pulaski. This is the site of the Foster Falls Mining & Manufacturing Co.'s plant. Across New River, above the falls, are the hematite ore banks.

Ivanhoe, Wythe county, 32 miles from Pulaski, is the present terminus of the Cripple Creek extension. The line which is under construction up the Cripple Creek will extend to Speedwell, with a possibility of its further extension through the Rye Valley iron district to the waters of the South Fork of the Holston and thence to Abingdon, making a loop line with the main line to Bristol. One iron furnace is operated here. The North Carolina extension, up New River to to the mouth of Chestnut Creek, and thence to a connection at the State line with the Cape Fear & Yadkin Valley Railroad, will form a through north and south line from the Carolinas to Ohio, as soon as the Ohio River extension, now under construction from Elkhorn, W. Va., to Ironton, O., is completed. Ivanhoe promises to be one of the most important manufacturing towns of this section of Virginia. An additional iron furnace is to built and zinc furnaces are projected.

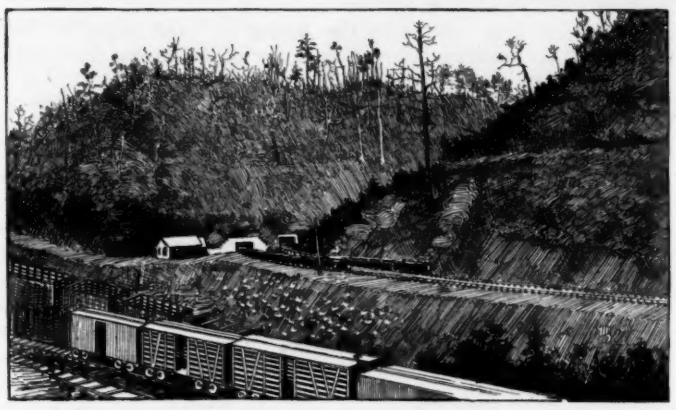
In former years Max Meadows was an important town for shipping charcoal pig iron that was taken from furnaces located eight to ten miles south in the Cripple Creek district. The building of the Cripple Creek extension saved the furnace-men the wagon haul, but left Max Meadows to become a small way station, from which the principal shipments are live stock. Shrewd capitalists, appreciating the advantage in iron-making of the close proximity of ore and limestone supply to a furnace plant, bought valuable ore banks but a few miles distant from the railroad station, purchased all the land surrounding the old town, and organized a land company, and the Max Meadows Furnace Co. The furnace is now under construction.

Bristol, Washington county, with a population of 10,400, is the western terminus of the Norfolk & Western Railroad. At this point freight and passenger traffic is exchanged with the East Tennessee, Virginia & Georgia Railroad. Here, as at other mineral centers from Lynchburg westward, elaborate preparations have been made in the survey of the environment into business and building plots for the rapidly increasing inflow of investors and workers from other States. A blast furnace has recently been constructed.

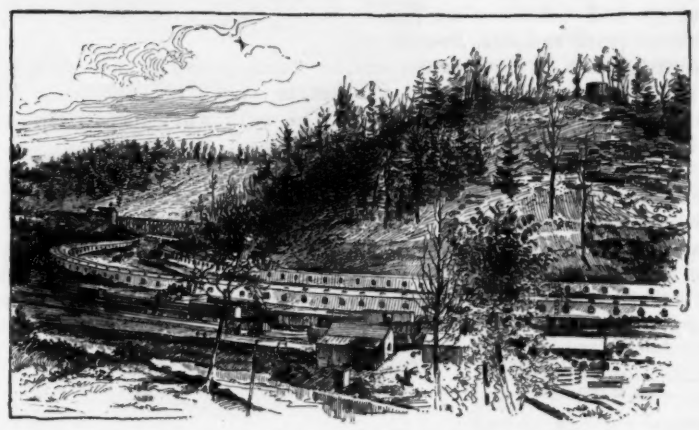
Graham, Tazewell county, 66 miles from Radford, is the point at which the Clinch Valley extension and the Flat Top division of the Norfolk & Western Railroad unite. The Graham Furnace Co. is building a furnace here, and the Virginia Lumber Co. is erecting a large saw mill and wood-working establishment. The Clinch Valley division is being extended to the town of Norton, and the junction with the Louisville & Nashville system will be effected at that point before January 1, 1891.

Richlands, Tazewell county, is one of the phenomenal new manufacturing towns of the present time. Capitalists of Philadelphia and New York invested in the coal lands of Tazewell county long before the Clinch Valley extension was determined upon. When it was built it ran directly through their property, and by a short branch three miles long developed their coal property. With pluck and determination they laid out their city; contracted for a $50,000 hotel, a large rolling mill and wrought iron pipe works, office building, employees' houses, etc.

Other important centers are: Pocahontas, Bramwell, Dahring, Radford and Elkhorn. At Elkhorn are eight coal-producing and coking concerns, from which the long and wonderfully sinuous "Ohio Extension" of the Norfolk & Western Railroad is being pushed with vigor across West Virginia to the Ohio River.

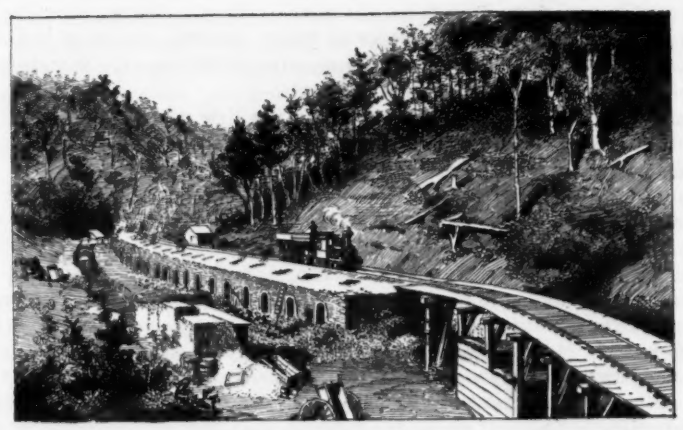


COAL MINES AT POCAHONTAS, VA.



COKE OVENS AT POCAHONTAS, VA.

COAL MINE AND TIPPLE ON THE BLUESTONE, W. VA.



COKE OVENS ON THE BLUESTONE, W. VA.

The remarkable Pocahontas coal fields are well known throughout the country. The area of these steam and coking coal beds extends through Tazewell County, Virginia, and Mercer, Wyoming, McDowell and Raleigh counties, West Virginia. The Pocahontas coal exists in three workable beds or veins, above water level; that which is chiefly worked being known as No. 3, and having a thickness in the vicinity of Pocahontas of eleven feet three inches. It has been estimated that this vein should yield 10,000 tons per acre, while those above it should produce each 6,000 tons additional. The almost unrivaled quality of this coal for steam-making purposes is now a matter of general knowledge. As compared with samples from five of the leading coal districts of Pennsylvania and one from Wales, it stands highest in fixed carbons and lowest in ash, sulphur and volatile matter. Fourteen corporations and firms are now engaged in coking operations in this field, running a total of 1,765 ovens, with 247 additional ovens under construction, and about 700 contemplated to be built, as the requirements of coke for furnaces demand. To these others are constantly being added. The relative value of this coke product, as compared with that used at the furnaces of the Alabama, Tennessee and Pennsylvania (Connellsville) iron-making districts, is shown in the fact that the percentage of sulphur and ash in the Flat Top coke is very much lower, and the percentage of fixed carbon very much higher than those of either of those districts. The total output of coal from this region for 1889 was 1,785,292 net tons, and the coke production was 312,310 net tons.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

At the East Dangler, on the west ½ northeast ¼ sec. 13, the exploring work is still continued with vigor and with considerable apparent encouragement. At a depth of 36 feet some fair quality of ore was struck and passed through for 20 feet, it having the usual dip to the north. The shaft was continued to the depth of 65 feet, and a crosscut is now in to the south about 35 feet. At 15 feet from the shaft a 10-foot vein of banded ore was cut, since which the drift has been in a gray soap rock, such as forms the capping to the main body of ore in the Germania and several other mines. This crosscut will be pushed to a considerable distance yet, and another will also be run to the north to intersect the vein of ore passed through in the shaft and ascertain its character and dimensions at this depth.—[Pick and Axe, Bessemer.

The Mikado people have at length succeeded in getting control of the water in their 300-foot shaft. This shaft was sunk about three years ago by the former management. At a depth of about 200 feet a fine vein of ore was passed which, rather anomalously, had a slight dip to the south. The shaft was carried on down to 300 feet, and a crosscut run to the south, reaching the ore vein at a distance of 40 feet. At this depth the formation was found to have its normal dip to the north. Upon cutting the ore the workmen were driven out by the inrush of water. At this depth, 270 feet, a new cross-cut was started to the south. When in about 20 feet from the shaft, another sudden inrush of water, as if a subterranean lake had been tapped, again drove the workmen out and rose above the pumps. It is reported that the ore has just been struck.—[Pick and Axe, Bessemer.

A working shaft, 8x12 inside timbers, has been started on the old Miner & Wells property. It will be sunk 300 feet to strike the ore body found there with the diamond drill last Winter. The work will be under the direct charge of T. F. Waters.—[Florence Mining News.

MARQUETTE RANGE.

Mining operations have been suspended at the Milwaukee mine, every ton of ore in sight having been taken out. As soon as the stockpile of some 2,000 tons has been shipped the men will be discharged, the equipment removed and the lease surrendered. The Milwaukee mine was discovered in 1879 by Messrs. Adams and Foley, who sold it the following year to the present company for $100,000 cash. In all it has produced 281,649 tons of ore, to-wit:

1879	941	1882	40,891	1885	38,466	1888	48,908
1880	15,142	1883	805	1886	46,642	1889	52,728
1881	31,635	1884	25,991	1887	50,470	1890	25,000

—[Negaunee Herald.

Several parties of this city are interesting themselves in the formation of a new iron mining company, to operate on land in the vicinity of Charley Werner's homestead, near Schwitzer's Mill. Recent developments on the property encourage this move.—[Negaunee Herald.

The equipment of the Grand Rapids mine is about to be increased by the addition of a double engine and a pair of 5-foot hoisting drums of the C. M. Bullock manufacture. The new machinery arrived Wednesday morning and is being set up at the mine.—[Negaunee Herald.

Rumors have been rife the past week that the Erie mine, which has been idle for the past six years, would be again opened. This mine, while in active operation, employed about fifty men and was considered good property. But on account of bad management, and the stagnancy of the iron market, it was closed down. While it was in operation its average shipments were 8,000 tons annually. During the past week the mine was visited by several leading mining men including Dan Crawford, M. Finn, J. R. Gordon, of Hancock, and were accompanied by Capt. Jas. H. Cundy, of Champion mine. It was impossible to secure any definite information in regard to the determination arrived at by this party. Since the above was in type we learn from a reliable source that the above-named parties have gone to Chicago to secure an option from the controlling owner, a leading lumberman by the name of Coleman. There is no doubt but that he will accept the propositions that will be made to him, and, if present indications hold good, new and improved mining machinery will be put in and the mine worked for all it is worth.—[Republic Sun.

MENOMINEE RANGE.

The Nighthawk mine, located on the northwest quarter of section 18, 42 33, Michigan, owned by Messrs. H. Dixon, R. D. Perkins and Thomas Trevena will probably be sold to Angus Smith and other Milwaukee capitalists within a few days. The purchase price is not known to the writer, but is said to be quite a nice little sum. The Nighthawk is located upon the "forty" immediately east of the Mastodon mine, but is believed to possess the Dunn vein, the product of the mine corresponding in a great measure to that yielded by the Dunn mine. A working shaft is down 65 feet, 55 of which is in ore. The ore is an excellent grade of non-Bessemer, the lowest analysis ever made showing 56 per cent. in iron near the surface, while ore taken from the lower part of the shaft goes as high as 63 per cent. A large amount of ore is already in stock, and the Nighthawk is sure to become a large shipper during the season of 1891.—[Florence Mining News.

It is rumored that Ferd. Schlesinger has his eye on the Millie, at Iron Mountain, and it is extremely probable that the valuable property will soon pass into the hands of his syndicate. The Millie is a first-class Bessemer mine, and was formerly known as the Hughitt.—[Florence Mining News.

Capt. James Tobin certainly has an iron mine on the southwest quarter of section thirty, 43-32, not more than one-quarter of a mile from the open pit at the Shafer mine. Exploratory operations were commenced there in June last; a number of test pits were lowered on the side hill and one of them at a depth of 27 feet penetrated the ledge of ore. The pit was converted into a working shaft, and continued on until now 25 feet of ore has been penetrated. Early in the ledge the ore was not perfect but with depth it cleaned up until now it shows nothing but what should be. A boiler and pump will be placed as soon as possible, and the shaft continued on to a depth of 100 feet, when its width and length will be ascertained by drifts and cross-cuts. It is, indeed, a fine showing and there is not a doubt but that it will develop a mine. The ore is not unlike the product of the Shafer, it being no doubt a continuation of that vein.—[Diamond Drill, Crystal Falls.

A New Ore Shipping Port:—

It is said that the Milwaukee Northern Railroad Co. has decided to construct ore docks at Huron Bay, on Lake Superior, and already has about a thousand men engaged on the work of building an extension of their line from Champion to that point. The distance from Champion is about thirty miles, and it is said that an easy route has been found. Huron Bay is said to possess splendid advantages as a harbor, and as the company must have a port if it wishes to engage in the ore-carrying business, it probably could do no better than to select this place, unless it saw fit to go to L'Anse. From the Republic, Champion and Michigamme mines the harbor will be about as near as that of Marquette, and will be about a third further from Iron Mountain than to Escanaba, so that it is not so far out of the way as one might imagine. Vessels will have a few miles further to make than they would in going to Marquette, but the extra distance will not amount to much. The addition of the Milwaukee Northern to the ore-carriers of this peninsula ought to prove an important one. The road is enterprising, is looking for business, and ought to prove a competitor that will be of value. It is said that 800 men will be engaged in the task of clearing the right of way.—[Iron Ore, Ishpeming.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, August 27th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Grand Rapids	5,245	New York	1,791
Barnum	6,098	Humboldt	12,425	Pitts. & L. Angeline	171,202
Buffalo	56,411	Imperial	16,247	Prince of Wales	16,241
Cambria	48,930	Jackson	76,993	Prout	8,775
Champion	154,380	Lake Superior	194,202	Queen	72,872
Cleveland	161,922	Lillie	23,086	Republic	124,844
Cliffs Shaft	111,282	Lucy	31,367	Republic Reduction Co.	1,115
Detroit	2,639	Marquette Ore Co.	1 057	Salisbury	60,658
Dexter	630	Michigamme	40,331	South Buffalo	79,758
East New York	20,481	Milwaukee	21,861	Volunteer	79,579
Fitch	6,049	Negaunee	43 410	Winthrop	56,693
Total, Marquette Range					1,710,605

MENOMINEE RANGE.

Aragon	17 785	Hamilton	13,881	Paint River	34,768
Armenia	18,651	Iron River	87,927	Perkins	6,059
Chapin	432,585	Ludington	52,133	Pewabic	9,036
Commonwealth	72,388	Mansfield	4,886	Shafer	32,274
Cyclops	39,248	Mastodon	44,938	Sheridan	595
Dunn	83,185	Mastodon South	514	Vulcan	78,637
Florence	126,970	Millie	20,613	Youngstown	24,825
Great Western	51,397	Monitor	11,682		
Half and Half	383	Norway	40,936		
Total, Menominee Range					1,306,296

GOGEBIC RANGE.

Anvil	20,780	Father Hennepin	8,184	Pabst	76,069
Ashland	269,993	Federal	7,612	Palms	17,077
Aurora	145 940	First National	105	Ruby	6,572
Brotherton	35,485	Germania	26,154	Section 33	60,628
Cary	45,654	Iron Belt	69,927	Superior	16,117
Colby	139,749	Montreal	6,630	Trezona	29,601
Davis	564	Mt. Hope	34,084	Windsor	19,339
Eureka	18,151	Norrie	509,773		
Total, Gogebic Range					1,564,133

VERMILION RANGE.

Chandler	214,217	Minnesota Iron Co.	338,181	Pioneer	4,600
Total, Vermilion Range					556,998
Grand Totals					5,138,033
To corresponding date of 1889					4,401,338

EMERY WHEEL DRESSER.

This tool is intended for trueing, shaping, sharpening and removing the glaze from solid emery wheels running at full speed. The cutting wheel is mounted to turn freely on a shaft in the forked end of the handle, which is held firmly to the rest in the same manner as resting a hand-turning tool, the cutter being brought in contact with the emery wheel, and moved slowly back

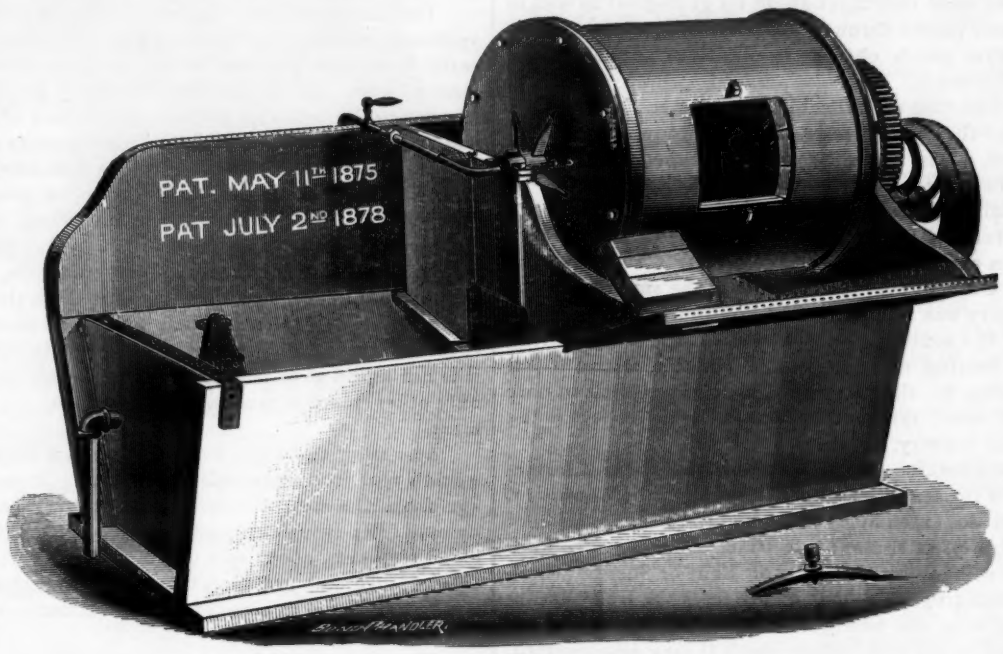
and forth across the wheel until the latter becomes true or the glaze is removed. The cutting wheel is formed of a bushed hub, in which two sets of serrated, hardened steel blades are inserted. The tool does its work rapidly and thoroughly, and may be used until the blades have been worn to the hub. This dresser is made by the Star Machine Co., of Philadelphia.

CINCINNATI *Commercial:* The experiment of the great Commonwealth of Ohio in establishing and maintaining a free bureau of employment will be watched with much interest by sociologists and political economists. If a State is successful in maintaining an employment agency, through which employers and unemployed can be brought together, it will be the opening of an entirely new era in the labor world.

A "UNIVERSAL EXHIBITION" for Berlin has been spoken of within the last few days. The year 1896 is hinted at as the date of opening, so that intending exhibitors are allowed sufficient time to prepare for the "event." The next big "show" thereafter will probably be held in the year 1900, and would be representative of the world's scientific and industrial progress during the century.—[Glasgow Engineer.

TODD'S PATENT RUMBLE.

For cleaning brass castings and scrap metal, the machine herewith shown possesses many points of superiority. It is now in use in most of the large manufactories of brass goods throughout the United States, and is acknowledged by all to be one of the most useful and among the greatest labor-saving machines ever put on the market. Many of the manufacturers using it acknowledge that it saves the cost of the machine every month. This machine not only cleans the outside of castings, but removes the sand from the inside cored work thoroughly without the use of acids. The castings, after being removed from the grates, are placed in the machine without brushing, and in a few minutes come out perfectly free from sand. By this new process castings are not hardened in cleaning as they are by the old. They come out of the machine just as soft as when taken from the sand. The most delicate castings can be cleaned by this process without injury to the fine points, keeping the corners perfect. It is claimed that tools will last from four to six times as long on castings cleaned by this process as they will on castings cleaned by any other. Foundry sweepings and skimmings are cleaned by this machine perfectly, ready to go into the crucible. By this process no metal can be wasted, the finest particles are saved. The machine is provided with tight and loose pulleys, doing away with the necessity of a countershaft in most cases. Full printed instructions for setting up and operating are furnished with each machine. The floor space occupied by No. 1 machine is 4 feet by 6 feet 6 inches. Floor space occupied by No. 2 machine is 3 feet 6 inches by 5 feet 6 inches. The weight of the No. 1 machine is 1,050 lbs; weight of No. 2 machine 650 lbs; power required to operate this machine from one-fourth to one-half horse-power. The above machines are for sale by J. D. Smith & Co., No. 827 Freeman avenue, Cincinnati, O, who are the agents for that city and vicinity, who will furnish further information and catalogues upon application.



TODD'S PATENT RUMBLE.

ALUMINUM IN IRON.

Henry M. Howe writes the *Engineering and Mining Journal:* Nearly three years ago (this journal, October 29 1887, p. 315), I questioned whether the remarkable effect of a minute quantity of aluminum in permitting us to cast extremely soft ingot-iron, very low in carbon, into very thin and difficult castings, was due, as had been positively stated and handed about from mouth to mouth, to a direct lowering of the melting point. I pointed out certain reasons for doubting this, and indicated that the remarkable results observed might be explained otherwise. But the momentum of a tradition, especially when fostered by interested people, and when it offered an obvious and simple explanation of a most striking phenomenon, was not to be checked, and to-day all but the most thoughtful accept this utterly unfounded belief as unhesitatingly as people once believed that the action of the syphon was due to nature's abhorrence of a vacuum. On May 3, 1889, even Sir Henry Roscoe said unreservedly "aluminum added to molten iron and steel lowers their melting points."*

It was not without a little gratification that I read the following extract from a letter written by the distinguished young metallurgical physicist, Mr. F. Osmond, to a friend. Referring to an alloy which he sent me, ingot-iron containing 0.10 per cent. of carbon and 5 per cent. of aluminum, Mr. Osmond says that he "heated a sample up to 1,465 degrees C. At this temperature the irregular movements of the pyrometer indicated the approach of the fusing point, and after the experiment was finished and upon removing the tube, actual indications of fusion were met with. It would, therefore, not be beyond the mark to say that the actual fusion would take place at 1,475 degrees C. As ordinary soft steel melts at about 1,500 degrees C., it is therefore very apparent that 5 per cent. of aluminum has only lowered the melting point about 25 degrees C., in fact, practically nothing. It is, therefore, absolutely incorrect to say that 0.1 per cent. of aluminum lowers the fusion point many hundreds of degrees, as has been stated. All that aluminum can do is to reduce the oxide of iron, make a thin slag, and thus purify the metal, and allow it to run more fluid."

While I think that M. Osmond is here, as in some other cases, a little hasty in his inferences, his experimental skill is beyond cavil, and his results certainly go far to confirm the doubts which I thus early expressed.

As I write, a most striking sample of gray cast-iron lies before me. It was made by adding 3 per cent. of aluminum to common spiegeleisen. The characteristic broad tabular fracture of the spiegeleisen has given place to a fine granular fracture, for all the world like that of common No. 3 pig-iron. I here give the composition of the metal before and after the addition of the aluminum:

	Spiegeleisen.	Gray iron.		Gray iron.
Combined carbon	4.8	0.93	Phosphorus	.05
Graphite	0.	3.45	Sulphur	.01
Silicon	....	1.30	Aluminum	3.19
Manganese	13.65	11.75		

This specimen is most suggestive. First we note that aluminum, as has previously been stated, has an effect closely like silicon, in lowering the solvent power of iron for carbon, and thus driving the carbon out of combination and into the graphitic state. Like silicon, then, it opposes the action of manganese, which, like chromium, increases the solvent power for carbon.

The resemblance between the behavior of aluminum and that of silicon at high temperatures early attracted attention. Here we have another striking resemblance, their common power of dislodging carbon during the solidification and cooling of iron.

The great change in its affinities which aluminum seems to undergo rather rapidly at high temperatures leads us to wonder whether, like iron, nickel and cobalt, which undergo sudden and remarkable changes at high temperatures, aluminum may not on minute examination be found to possess a distinct critical point, at which its specific heat changes abruptly with accompanying marked thermal phenomena.

Finally, accumulating facts seem to indicate that the broad tabular fracture of spiegeleisen is not due directly to the presence of manganese, but to the large proportion of combined carbon which that manganese permits the iron to retain. For we find ferro-chrome, whose composition resembles that of spiegeleisen only in its high proportion of combined carbon, with a fracture which most people would pronounce unhesitatingly to be that of spiegeleisen. Further, cast iron for the basic Bessemer process, whose composition has, in common with that of spiegeleisen and ferro-chrome, nothing but a high percentage of carbon, has a fracture strikingly like that of spiegeleisen, and the more strikingly like it the higher the proportion of combined carbon. This high proportion of combined carbon is doubtless chiefly due to the intentionally very low proportion of silicon present. And as the lower the silicon, the better the iron for the basic process, so may it be graded by its fracture, the best iron resembling spiegeleisen the most closely. Here is the composition of a pig which had the characteristic spiegeleisen fracture with the irridescence and all:

Combined carbon.	Silicon.	Manganese.	Phosphorus.	Sulphur.
4	.02@.05	0.20	2.7	0.03

Here is another striking fact, bearing on the explanation of the Mitis process. Aluminum was added to some molten steel, which I believe was very soft, if not oxygenated, ingot iron. It quieted the metal completely, and caused it to pipe deeply. This, of course, is the old story. But what is striking is that little white specks were found on the surfaces of the ingots. They were picked off, analyzed and found to be alumina!

A very distinguished continental steel-maker lately asserted publicly that the effect of aluminum could not be explained by supposing that it reduced iron oxide, because his chemist had repeatedly analyzed steels on which aluminum exerted its marked effect, and that before the addition of the aluminum they were quite free from oxygen. Visiting his establishment, I eagerly sought the details from his chemist, who, to my surprise, informed me that his master had misunderstood him, and that actually he had found oxygen in nearly all the steels, redshort or sound, which he had examined. He had analyzed at least twenty specimens, using the hydrogen method, with the elaborate precautions which Ledebur has described. In one or perhaps two crucible steels he found no oxygen. In all the others he found from 0.06 to 0.12 per cent. Strangely enough, he could trace no connection between the properties of the metal and the proportion of oxygen which they contained. This fact I commend to the consideration of those friends who are quite sure that the burning of iron is essentially due to oxidation.

* Discourse delivered at the Royal Institution, May 3, 1889, p. 13.

Flat-irons Heated by Electricity.

No end of additions may be made to the list *Hardware* has already printed of household appliances in which electricity is used. Flat-irons heated by electricity are now made which are very serviceable, says the *Scientific American*. The flat-iron is the most usual form, but made hollow. The interior contains a lot of coiled wires, through which the electrical current passes and heats the wires red hot. The latter are arranged between protecting sheets of mica and asbestos. You turn a switch, and the flat-iron at once heats up ready for use. The street wires supply the electrical current. In the same way all kinds of domestic utensils may be heated, such as cake bakers, meat broilers, coffee pots etc. Electrical platters for keeping food warm when on the table may be had Electrical heaters for warming apartments are also made.

THE ORIGIN OF IRON.

The term *evolution* has now taken such a firm hold of the English language, that its significance is gradually being widened, and it may be applied with equal correctness to things inorganic as well as to those which pertain to life. As in the organic world the teaching of the age is to show that the plants and animals of to-day, in all their endless varieties, had their existence bequeathed from a more restricted group, and that group in turn from a still more restricted one; so in the inorganic world the myriads of compounds, however complex, are referred backward until nothing is left but the 64 or 65 elements which forms the world's alphabet. Some have even been bold enough to suggest that everything may yet be referred back to a single primordial element, hydrogen. In treating, however, of the origin of iron, we are not dealing with a complex mineral or other substance which has been evolved out of simpler compounds, and ultimately from its elements, but with an element itself, if we except the impurities which are inseparable from commercial iron. All the same, we hope to show that throughout its geological as well as its metallurgical history, iron has passed through processes of evolution which, if not exactly analogous to that which obtains in plants or animals, is not necessarily devoid of scientific interest.

The later stages in the production of malleable iron—the rolling mill, the forge, the puddling furnace and the blast furnace—are well known and understood by readers of this journal. It is when the ore is reached and the geological history of iron has to be traced, that the real difficulty begins.

Before dismissing the metallurgical side of the question, a word is due to the curious change which advancing knowledge has worked on the *locale* of iron manufacturing in our own country. One of the greatest steps in this onward march was the substitution of coal for charcoal in the smelting of the ore. The result of this discovery was that instead of continuing to be carried on in the wooded districts of the southeast of England—iron manufacturing was transferred to the coal bearing districts of the country, where it has remained ever since. While this is the retrospect, it is interesting to note—in the light of recent events—what the possibilities are with respect to the future production of iron in our country.

A high authority—Mr. Boyd Dawkins—is of the opinion that the coal formation recently struck at Dover is the same as that which crops on the Continent, and in the Belgian Ardennes is so extensively employed in the production of iron. This means the possibility, at some future time, of landing ore from Spain or other parts of the Continent, on the coast of Kent or Sussex (which will be more profitable than bringing iron stone or ore from the iron-bearing districts of England), smelting it on the newly developed coal field, and thus bringing the iron industry back to the very haunts which it long ago deserted, seemingly for ever. Philosophers tell us that the world moves in circles, and while the circulation in the present case may be slow and somewhat problematical, it is none the less—judging from present appearances—well within the scope of possibility.

Passing from the metallurgical side of the question, the first thing that has to be considered on the geological side is the ores of iron, or ironstones. Iron is not only the most useful of all the metals, but, under one form or another, the most widely distributed. In all geological formations it is found both in sedimentary and igneous deposits. It is also found in plants and animals, as well as in water, both sea and fresh. It is only, however, when the proportion of iron exceeds 16 per cent. or thereabouts, that the material is considered an ore of iron, or ironstone. In the great bulk of ores the metal exists in chemical union with sulphur, oxygen, or carbonic acid, and while Nordensjold describes the occurrence of metallic or native iron in some volcanic deposits in Greenland, the presence of metallic iron, when found in the earth, is usually attributed to meteoric sources.

Iron ores are found as sedimentary deposits, and also as masses and veins. The British deposits, so far as at present worked, belong to the carboniferous age, with the exception of the extensive clayband deposit of Cleveland, which belongs to a later period, and all are included under the division sedimentary or deposited by water. The deposits known as *masses* are met with in Scandinavia, Styria, and other parts of the Continent, and there are also many examples of this sort of deposit in the United States. Masses along with veins or lodes are considered due to the action of heat, and are termed igneous, as opposed to sedimentary, and they have been ejected from below instead of laid down from above. Putting all iron deposits under the broad classification of sedimentary and igneous, attention will first be directed to the former of the two.

Sedimentary deposits having been laid down by water, it follows that the water must have obtained its supply from previously existing ferruginous rocks. That many of the plutonic rocks contain iron compounds may be easily proved by examining the exposed sections of the trap rocks which are scattered up and down the country. While a fresh fracture of those rocks shows the interior to be dull gray or black, the weathered surfaces are often found to be of a rich brown color. This is due to the action of rain and atmospheric agencies washing out the soluble constituents, such as lime, potash, etc., setting free the oxide of iron which gives the characteristic coloring to the exposed or weathered surfaces. The probability therefore is that the sedimentary deposits of iron ore have been derived from the denudation of earlier rocks. The silica of these earlier rocks would be deposited in one place to form sandstone, the aluminum-silicate in another place to form clay or shale, while the iron, in accordance with its specific gravity, would also be deposited by itself in beds of greater or lesser magnitude, according to the time the process went on. These beds would subsequently become subjected to the pressure of overlying strata, and according as they would be affected by other phenomena, such as heat, infiltration, etc., some of the characteristics would be stamped upon the deposits which are known to distinguish them to-day.

It will now be noticed that this theory of the formation of sedimentary beds allows of the two classes of deposits—so far as further investigation is concerned—being merged into one, and that is the *igneous*.

To affirm that all the world's iron has been derived from igneous rocks, is to say that, in one way or another, it has been ejected from the earth's interior, or from some source deep down in the earth's crust. Though circumstances prevent this from being openly demonstrated, there is strong circumstantial evidence which points to this conclusion, some of which will be briefly noticed.

From several independent observations and calculations, it has been found that the specific gravity of the earth as a whole is about 5 5, while the average of rocks at the surface is rather under half this amount. Some have argued that the increased specific gravity is obtained by excess of pressure, but this view is not generally accepted. From the abundance of iron compounds in the crust and its apparent derivation from the igneous rocks, together with the suitability of its specific gravity (7 70) for balancing up the deficiency in the surface rocks, it has been argued that an immense store of metallic iron exists in the earth at a certain depth not exactly determined.

The action of the dipping needle, which is always accentuated by an approach to the polar regions, where, presumably, the so-called crust of the earth is thinner, has also been cited as supporting the theory of an internal mass of iron. In the excellent papers by Professor Rucker on "Underground Mountains," which appeared recently in one of the popular monthlies, allusion was made to the action of deep igneous rocks on the dipping needle as exhibited on the Thames Valley. This action was ascribed to the metalliferous nature of these rocks, and as these rocks must have come from below, they may be fairly held as supporting the theory of an internal mass. It might further be pointed out that in the meteorites which occasionally visit our planet, a common constituent is metallic iron, often so pure as to admit of its taking on a brilliant polish. Seeing, then, that *metallic* iron exists in some extra-terrestrial sphere, which gives rise to our meteoric visitants, there is surely no reason why it should not exist in this state on the earth, and seeing it is not found at or near the surface in this condition (metallic or native), the only other place it can be is deeper down, or, in point of fact, in an internal mass.

Assuming that some evidence has now been adduced to indicate where the world's real iron store exists, a difficulty is encountered in following its passage from the metallic condition to its various forms of combination as found by man. Knowing the readiness of iron to combine with oxygen, sulphur and other elements, about as much as one can do is to imagine varying degrees of temperature and pressure, together with eruptive action, and a long draft on the bank of time to account for the various forms of ores and stones in which iron is now found.

The subject may be further pursued and the question asked, "Whence has the earth all this iron?" Seeing that iron forms such a large proportion of the earth's mass, the answer to this involves the question of the origin of the globe itself.

Hypothesis has been said to be the life of investigation, and so it is now affirmed by the highest authorities that the earth, and consequently its iron, at one time formed part of the sun. In using the term *sun* it is understood that not only is the sun-nucleus meant, but also the deep covering of incandescent vapors which surrounds it, and which, for convenience, may here be termed its atmosphere.

There is important evidence to be derived from the consideration of the specific gravity and other circumstances attending the outer or more distant planets of the solar system, which go far to show that the whole system at one time formed part of the sun, but the earth's resemblance to the sun in chemical composition will only be alluded to here.

The labors of Kirchhoff and Bunsen, with the spectroscope, have revealed in the sun no fewer than twenty-five elements, all of which are known among things terrestrial, and there is every reason to believe that the remaining elements either existed at a former period, or exist now, in the sun. Among the metals discovered in the sun's atmosphere is iron, and, in consequence of the enormous heat, it, along with other metals, is in a state of vapor.

Not only is the presence of iron unmistakably made out, but its position among other metals is just where it might be expected, having respect to gravity and the atomic weights which these metals are known to possess on the earth. The study of other metals in the sun, as revealed by the spectroscope, goes far to support the hypothesis of the earth's solar system, but is beyond the scope of present paper.

The subject of iron must ever be an important one in a country whose prosperity depends so much upon it, and the various metamorphoses through which it passes before it can form part of a mechanical structure should be of interest to every one who wishes for the continuance of our commercial prosperity.—[Progress, prize article in the Mechanical World, London.

$5 00. $5 00. $5 00

To Cincinnati and return via the Mount Vernon & Pan Handle Route, Saturday, September 6; tickets good up to and including September 9th. Trains leave Union Depot at 8:00 A. M. and 8:00 P. M. Pullman palace sleepers on night train. Call on ticket agents, Weddell House Corner; Union Depot; Euclid Avenue; Woodland Avenue or Newburgh for tickets and Pullman accommodations, or address C. L. Kimball, Assistant General Passenger Agent, 101 St. Clair street. Telephone, No. 27.

Go To

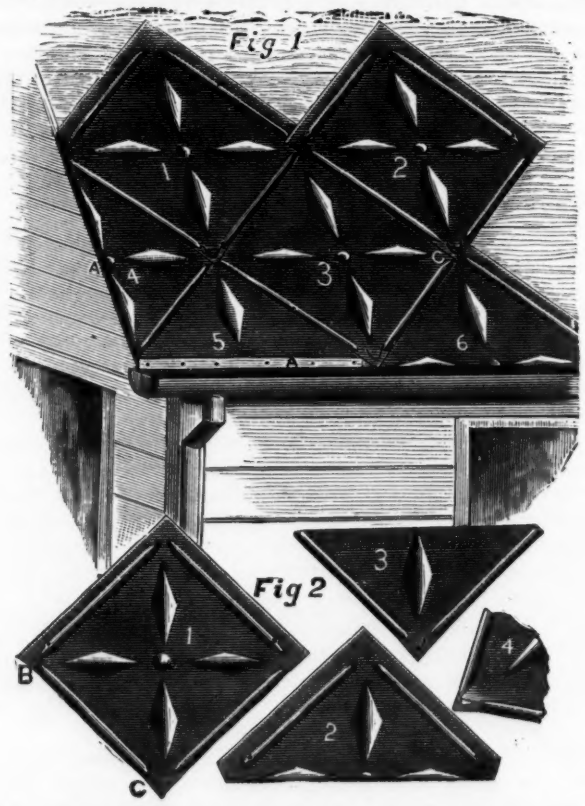
Cincinnati and back via the Mount Vernon & Pan Handle Route, Saturday September 6th; tickets good returning until September 9th. Fare only $5.00 for the round trip. Trains leave Union Depot at 8:00 A. M. and 8.00 P. M. Pullman palace sleepers on night train. Telephone No. 27, C. L. Kimball, Assistant General Passenger Agent, for full information.

METALLIC TILES OR SHINGLES.

The metallic tile or shingle herewith shown, is made from the Garry refined roofing iron or steel, also from galvanized iron and tin, painted with their "Metallic Paint." The sheets are 14x14, and will lay 12x12 inches, and are stamped into such forms as to make them impervious to rain, wind and snow, besides being architecturally tasteful in appearance. They are fastened to the roofing boards in such a way that they are held firmly and no exposure of nails. They are formed in a press, uniform in size and shape, and can be

easily applied by any one. Each plate fits in its place perfectly, so that the nail hole, the tongue on the lower end of each plate, and slot in each left hand side at the apex all come into their proper place, so there can be no mistake in applying. One hundred will lay a square. This roofing is used for mansard, gothic, Queen Anne, and all buildings having a quarter (¼) pitch. It is not calculated for flat roofs. It is beautiful, durable, light and cheap. It is well adapted for fancy siding.

In Fig. 1, 1, 2, 3, 4. 5, 6 represent the tile or shingle plates as applied to roofs; A A edges bent over eave and gable and nailed; 5 and 6 show half of eave plates; 4 shows half of plate for gable. In Fig. 2, 1 shows size of plate



or tile, 14x14 inches, and lays 12x12 inches; 2, eave plates; 3, comb plate; 4 shows tongue in lower end of plate; B slot to receive tongue C. For further particulars, prices, etc., apply to the Garry Iron & Steel Roofing Co., Cleveland, O.

The Queen Pays all Expenses.

The *Queen's* last "Free Trip to Europe" having excited such universal interest, the publishers of that popular magazine offer another *and* $200 *extra for expenses* to the person sending them the largest list of English words constructed from letters contained in the three words "British North America." Additional prizes consisting of silver tea sets, china dinner sets, gold watches, French music boxes, portiere curtains, silk dresses, mantel clocks and many other useful and valuable articles will also be awarded in order of merit. A special prize of a sealskin jacket to the lady, and a handsome Shetland pony to girl or boy (delivered free in Canada or United States) sending the largest lists. Everyone sending a list of not less than twenty words will receive a present. Send six U. S. 2c. stamps for complete rules, illustrated catalogue of prizes and sample number of the *Queen*. Address the *Canadian Queen*, Toronto, Canada.

INDUSTRIAL SUMMARY.

New Enterprises:—

A charter has been granted to the Burton Machine Co., of Erie, Pa., with a capital of $12,000. The directors are: Andrew Burton, J. W. Boomell, F. C. Burton and Wilmington Bowming, all of Erie.

It is said that contracts have been signed for the erection of a rolling mill, iron furnace, foundry and machine shops, and other industries at Kensington, Ga. Negotiations are also said to be pending for pipe works.

The Simmerly Derrick Co., of Cleveland, with a capital stock of $15,000, has filed articles of incorporation. The incorporators are: Albert N. Simmerly, M. J. Simmerly, J. M. Shallenberger, A C Dustin and C. A. Judson.

H. M. Lewis, of Hamilton county, O., and J. S. Pessenger, of Kings county, N. Y., have incorporated at Covington, Ky., the National Railway Forging Machine Co., to manufacture railroad forgings. The capital stock is $200,000.

Application will be made, September 16 next, for a charter of incorporation for the Boston Iron & Steel Co., of Pittsburgh, Pa. The incorporators are I. R. Jackson, James B. Murray, E. C. Converse, Horace Crosby and A. Chandon, all of that city.

The Coleman Rolling Mill Co., South Pittsburg, Tenn., has been incorporated, with Barry Coleman, of St. Louis, Mo., as President, to construct a rolling mill with a capacity of thirty thousand tons of iron per day, and at a cost of $85,000; capital, $150,000.

The Goshen Rolling Mill Co. have been incorporated at Goshen Bridge, Va., with $300,000 capital stock. The officers are: Henry Stephen, President and J. Y. Heckman, Secretary. This concern is backed by Philadelphia capital. The works will be erected at once.

It is reported that the Shenandoah Furnace Co., D. W. Flickwir, President, will build an extensive rolling mill plant at Shenandoah, Va. Frank C. Roberts, C. E., Philadelphia and Pittsburgh, has been engaged by the company as engineer, and will have entire charge of the work, both in its design and construction.

The Stirling Boiler Co., which, as previously stated in the *Beacon*, is to locate at Barberton (late New Portage, O.) organized by electing the following directors and officers: O. C. Barber, Chicago; Allan Stirling, John Jardine, Robert C. Alexander, New York, and Charles Baird, Akron. O. C. Barber, President; Allan Stirling, Secretary and Treasurer; Thos. Deigan of Pittsburgh is to be the general manager, and H. S. Pell, of Newcastle, Pa., superintendent. Mr. Pell will remove to Barberton at once.—[Akron (O.) Beacon.

The Akron Spirit Level Co., capital $25,000, which was recently incorporated by Messrs. Will Frank, C. Esselburn, G. K. Foltz, John C. Frank, Milton G. Frank, Will Laubach and Mrs. Eleanor Jasper, the last named being the patentee of the article to be manufactured, have received their charter. The principal point on which the patent is claimed is the security of the glass, in which is the liquid and leveling bubble, from breaking. To secure this the ends of the glass tube rest on hard rubber, which in no way affects the trueness of the level. A test was recently made of its indestructibility by throwing it to the street from the top of the Academy building five successive times and the rough usage in no way impaired the usefulness of the tool.—[Akron (O.) Beacon.

The following new companies have been granted licenses of incorporation by the Secretary of State of Illinois: Patent Wooden Hoop Lock & Hooping Machine Co., Peoria, to manufacture machines for hoop lock cutting and hoop-driving machines; capital, $100,000; incorporators, M. H. Ritzwaller, G. H. Wymond, Max Rosenow.—Lee Smoke Burner & Fuel Saving Furnace Co., Chicago, to manufacture smoke-burning apparatus under letter patent; capital, $500,000; incorporators, D. Lee, Charles O. Barnes and G. P. Merrick.—Chemical Automatic Sprinkler Co., Chicago, to manufacture automatic fire extinguishing apparatus; capital, $100,000; incorporators, John B. Skinner, G. L. Brown and M. J. Welch.—American Malleable Iron Co., Chicago, to manufacture malleable iron castings; capital $300,000; incorporators, E. P. Bailey, H. S. Burkhardt and Clayton Mark.

Enlargements, Additions, Removals, Etc.:—

The De Leach Manufacturing Co., of Atlanta, Ga., are putting up a new foundry and machine shop, 400x70 feet.

The Pennsylvania Rolled Steel Car Wheel Co. and the Continental Steel Co. have been merged into the Norristown Steel Co.

The North Chattanooga Manufacturing Co. will erect works for the manufacture of mill machinery in North Chattanooga, Tenn.

The Ellis & Lessing Steel & Iron Co., of Pottstown, Pa., are enlarging their works by the erection of a new building and adding two more puddling furnaces, making 22 in all.

The New Haven (Conn.) Wire Co., organized in 1888, with a capital of $10,000, have decided to remove to Aurora, Ill. The company have recently increased their capital to $30,000.

Fosgate & Lane, Auburn, N. Y., will remove their tack factory to Harriman, Tenn., and be known as the Harriman Tack Co. A site has been selected and a brick building 40x175 feet will be erected.

The Duthie Engine & Machine Shops, of Knoxville, Tenn., will, it is stated, be moved to Harriman, Tenn., and operated by the Duthie Machine & Foundry Co., which has been incorporated by G. H. Duthie, F. W. Sanders, W. C. Harriman and others, with a capital stock of $20,000.

The Lancaster Steel Roofing Co. has decided to move its plant from Lancaster, O.; to Duluth. The company now employs 25 men, but it is said the force will be increased to 100 men on its removal here. Roofing plates, eight feet long and two feet wide, are manufactured by this company.—[Duluth (Minn.) News.

The G. A. Gray Co., Webster street, Cincinnati, manufacturers of all sorts of iron working machinery, especially lathes and planers, have purchased a

site on the corner of Hamilton and Coe streets, Cleveland, and will remove soon to this city. The grounds selected are 200x330 feet and the shops will occupy the entire space. One of the chief reasons for the removal is that Cleveland lies in the center of a vast district where iron-working machinery is extensively used. Excellent inducements were offered the firm to locate elsewhere.

The Tyler Tube & Pipe Co., which recently removed from Boston to Washington, has quite a complete plant at the latter place. The officers are: W. P. Tyler, President; Walter Woodman, Treasurer; Edward Woodman, Calvin P. Sampson, W. P. Tyler, I. W. Mitchell, W. L. McCleary, J. H. Ellsworth, directors. The rolling mill contains an 18-inch three-high train of rolls, and is run by a Corliss engine of 300 horse-power. The mill building is 160x80 feet, with a corrugated iron roof. The tube mill is in a building 250x80 feet, and contains a modern gas regenerative furnace.

A Kaukauna, Wis., dispatch to the Duluth *News* says: "Kaukauna is to lose one of the most important industries in the city. The managers of the Atlas Iron & Brass Works have decided to accept the offer made by the Duluth people, and remove their works to that place. The offer includes a good site for the plant and a cash bonus of from $50,000 to $60,000. The plant employs 50 men, and is very completely equipped with machinery. The principal output is paper machinery. The transfer will be made in the course of 90 days. The company will be reorganized with a capital of $200,000."

Mention was recently made in these columns that the Swift Steel Works, at present located near Cincinnati, O., was soon to be removed to Duluth, Minn., a new company formed and the capital and facilities enlarged. From the Duluth *News* it is learned that the new concern has been incorporated under the name of the Ironton Steel & Iron Co., with a capital stock of $1,000,000. The incorporators are as follows: J. J. Sullivan, of J. J. Sullivan & Co., capitalists, Cincinnati; F. M. Williams, Newport, Ky.; Col. William Duffy, of the John Boyle Distilling Co.; C. W. Boyd, President of the Levania Mill & Lumber Co.; Dr. J. L. Wylie, a retired capitalist of Ohio; Hon. J. J. Bright, a West Virginia capitalist; Capt. Barrett and Mr. Atkins, both of the Duluth Furniture Co. The newly organized company will remove the plant to the site on the bay front, beginning about October 1, next, although the contract does not require that the works shall be in running order until August 1, 1891. In addition to the converter, there will be eleven mills, and 20,000 horse-power will be furnished by twelve engines to run the plant. All the buildings will be of iron and steel, one story in height. It is expected the output will be 200 tons per day. Capt. Barrett hopes to have the mills running by January 1, next.

Furnaces and Works Starting Up:—

The Carbon Iron Works, Pittsburgh, Pa., started up in several departments last week, and expect to be running in full this week.

The track bolt works of the Springfield Iron Co., Springfield, Ill., which were destroyed by fire July 12, have just been started up again. The entire plant has been thoroughly remodeled, and the facilities for turning out first-class work are greatly improved.

Fires and Accidents:—

On the 14th ult., a fire in the machine shop of W. H. Irwin, Allegheny, Pa, was extinguished before reaching the foundry, and did but little damage.

General Industrial Notes:—

The Bethlehem Iron Co., of Bethlehem, Pa., recently turned out successfully a casting which weighed about 125 tons. The casting is to be used as a bed-plate for one of the new presses to be used in the ordnance building.

The Cincinnati Forges Iron Co., manufacturers of iron and steel, also truck and engine axles, 18 Sinton Building, Cincinnati, O., report doing a good business, and an increase over previous years, would be pleased to receive calls from all interested in the articles made by them.

Mr. E. T. Barnum, of 179 Jefferson avenue, Detroit, Mich, has just issued his Fall supplement of wire and iron work. Mr. Barnum has achieved a wide reputation in the manufacture of flower pot stands, roof cresting, wire railing, fencing, window guards, fire escapes, jail cells, etc.

The Cleveland Wheelbarrow & Truck Co, 140 Detroit street, Cleveland, O., have just issued a new and enlarged catalogue of the wheelbarrows, trucks, etc., manufactured by them. This concern is constantly adding new designs and improvements, and will furnish catalogues and other information on application.

The Cleveland Metal Spinning Co. have purchased the plant formerly known as the Geo. Mettingers Manufacturing Co., of this city, manufacturers of copper and brass specialties, copper and nickel, copper tea kettles and other articles. The purchasers intend to remove to larger and more convenient quarters and enlarge the plant in the future, but for the present they will remain at the old stand, 29-33 St. Clair street.

G. D. Smith & Co., 827 Freeman avenue, Cincinnati, O., have just issued a new and complete catalogue and price list of all the articles manufactured and carried in stock by them, consisting of foundry facings and blackings, graphite, plumbago, supplies for iron foundries, brass foundries, rolling mills and furnaces, and in fact, they will outfit a foundry complete, with the exception of metals and fuels. The book is nicely gotten up with a colored cover, and will be sent on application.

John T. Tansley, manufacturer of patent K. D. factory trucks, swing cut-off saws, steam glue heaters, etc., has removed his office and factory from 203 and 205 East Front St., to 228 and 230 Main St., Cincinnati, O. In this more central location Mr. Tansley will be in better shape to meet the needs of his many patrons. He will, in his new place of business, be pleased to meet not only those who have been his customers for many years, but all who may need anything in his line.

R. Hesterberg & Co., manufacturers of iron globe gate and Jenkins valves, and general brass work, No. 168 West Second St., Cincinnati, O. This firm, proprietors of Queen City Brass Works, was established in 1884, and though only in business some six years, have worked up a very fine business, which has increased from year to year, the increase this year being more than fifty per cent. over last year. Their trade covers a good portion of the Northern, Eastern and Western sections of the country, and some in the South.

Detrick & Harvey Machine Co., of Baltimore, Md., have just completed an extension to their machine shop of 70x90 feet. Among other machine tools that they have in course of construction is one of their "F" open side extension planers, to plane 10x9x25 feet, weight 90,000 pounds, for the Walker Manufacturing Co., Cleveland, and a similar machine to plane 16 inches long, for the Stearns Manufacturing Co., Erie, Pa; also three threading and slotting machines for guns of 8-inch to 12-inch caliber, for the Watervliet Arsenal, West Troy, N. Y.

Messrs. Totten & Hogg, of Pittsburgh, Pa., are actively engaged in filling orders for rolls made expressly for the manufacture of tin plate for parties who are anticipating the speedy passage of the tariff bill. They have quite a number of orders of this kind. They have also just completed a 16 inch bar train for the Fort Payne Rolling Mill Co., of Fort Payne, Ala., consisting of three sets of three-high and two sets of two-high rolls, so constructed that all structural iron can be rolled in the same train without making the changes that usually have to be made.

Mr. James E. Scripps, senior proprietor of the *Evening News*, has placed the sum of $2,000 at the disposal of the trustees of the Detroit Museum of Art to enable them to offer that sum to defray the cost of two years' study in one of the great art schools of Europe as a prize for the greatest proficiency displayed by any pupil in the Detroit Art Academy in the ensuing year. The school opens September 15, and the award will be made at the end of May next. The prize is open to students from all parts of the country. Particulars will be furnished on application to the Secretary, Detroit Museum of Art.—[Detroit Times.

The Fred J. Meyers Manufacturing Co., of Covington, Ky., who are very extensively engaged in the manufacture of all kinds of wire goods and some hardware specialties, and all kinds of iron and steel work, public and private buildings, jails and stables, have been and are still doing a very large and increasing business over past years. This company have put up a new building, giving them increased facilities for carrying on their business. Along with their other lines of business they have lately received a contract for the iron and other work for the Government building being erected in Birmingham, Ala., for postoffice and United States Court.

W. J. Burton & Co., Detroit, makers of the "Eastlake" metal shingles for roofing and siding, have the following large contracts: St. Joseph's school, at Port Huron, Mich., galvanized iron cornices and tin work, roofed with "Eastlake" metal shingles; House of Providence, Detroit, Mich., galvanized iron cornices, tin work and roofing; also Central school building at Coldwater, Mich., which is one of the largest and finest in the State, galvanized iron cornices, roofing to be done by their agents, D. C. Allen & Co., Coldwater, Mich. Cornice shop as well as shingle works are working to their fullest capacity, and this season's output on "Eastlake" metal shingles will more than treble that of last, which is sufficient evidence of the superiority of the "Eastlake" as a roofing material.

Some months argo we inserted an item in these columns calling attention to the Cincinnati Wire Co., and the large business they were doing in the manufacture of all kinds of wire and all sizes of wire nails. At that time their business had increased in volume so much that they were obliged to keep their factory running day and night. This condition of business still continues, and the demand for their wire nails has steadily increased all the time, and continues to increase. On account of this condition of affairs the company have found it necessary to increase their facilities. An opprtunity having presented itself, they have sold their present buildings, which of themselves are quite large, and will build elsewhere on a more extensive scale. In addition to this large building for making nails they will also need a large building for a wire drawing plant. The Hazen Iron & Steel Co., carrying on business in the same building and forming some part of the other company in its business interests, also report a large and continually increasing trade.

Improve This

Opportunity to visit Cincinnati at a low cost via the Mount Vernon & Pan Handle Route, Saturday, September 6th; tickets good returning until September 9th. Only $5.00 for the round trip.

THE Kinzua viaduct is about to be removed shortly as competent engineers have pronounced it unsafe in its present condition. It crosses the gorge at Kinzua Creek, is 2,052 feet long and 301 feet above the water, and was constructed to hold a weight of 2,660 tons. It has long been considered one of the giant bridges of the world.

DON'T forget the Nickel Plate daylight excursion to Niagara Falls and Chautauqua Lake September 10, leave Lorain street, 5 o'clock A. M.; Pearl street, 5:10; Broadway Depot, 5:20 A. M; arriving at Niagara Falls at 1:30 P. M., returning leave Niagara Falls 7 o'clock P. M. same day. Tickets good returning until September 15th, $3 00 round trip

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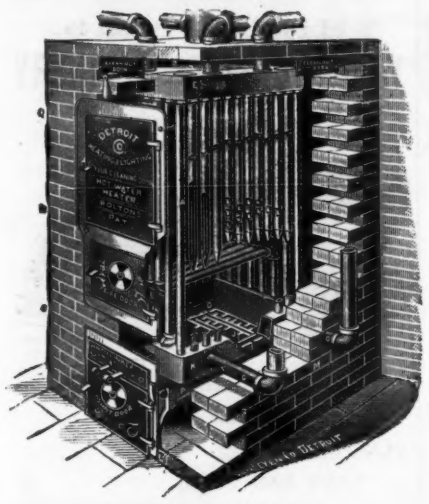
THE Clyde shipbuilding statistics for the month of July show that 15 steamers, 3 sailing vessels, and 5 yachts—aggregating a tonnage of 16,765 tons—were launched during the month; while the new orders contracted for during that period amounted to only about one-half the tonnage launched, viz: 8,000 tons.

EVERYBODY should go on the daylight excursion via the Nickel Plate, September 10th, to Niagara Falls with privilige of stopping at Chautauqua Lake without extra charge. For further information call on Nickel Plate agents.

BOLTON



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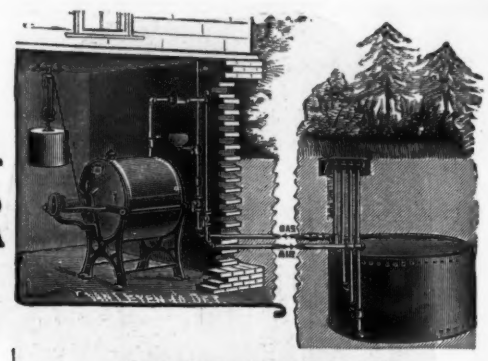

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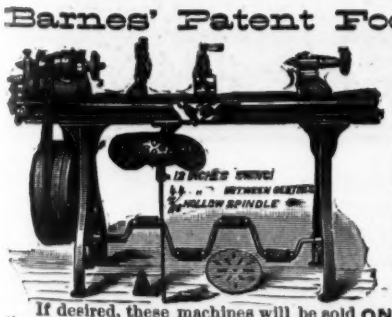

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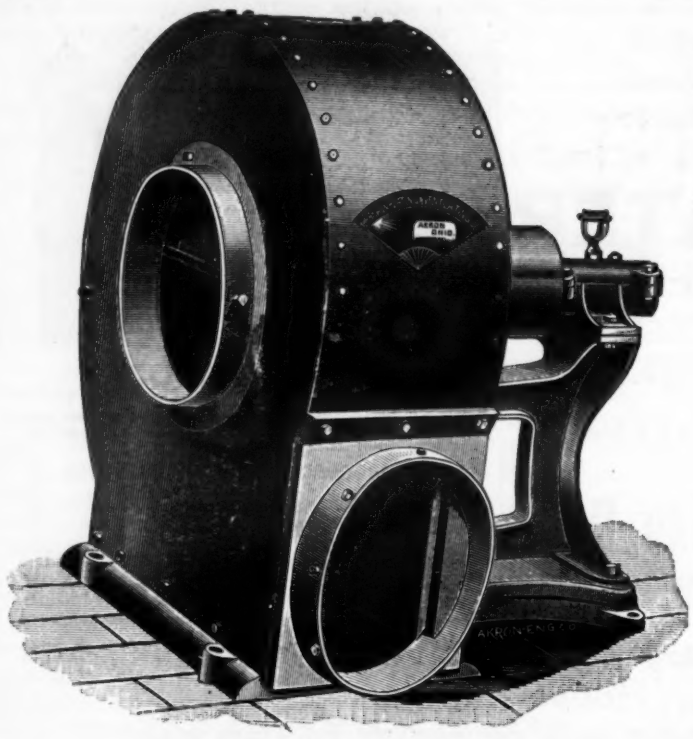

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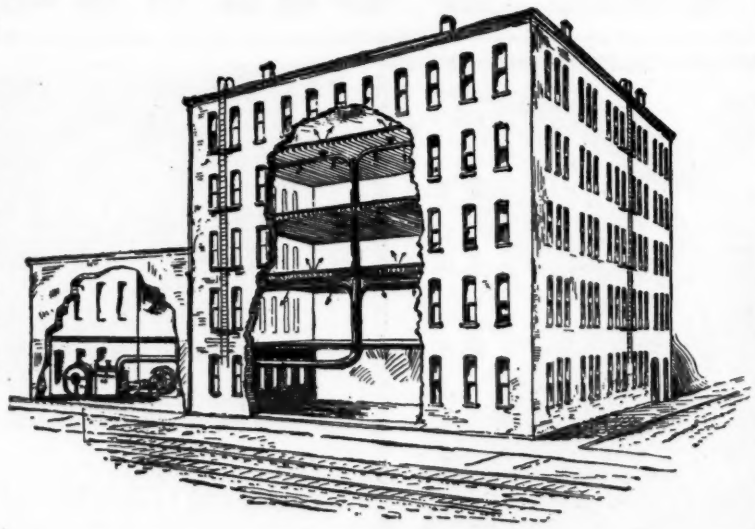

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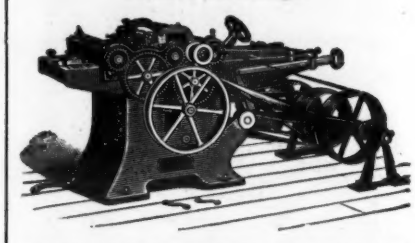

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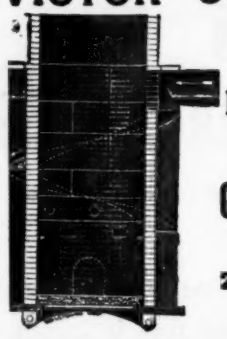

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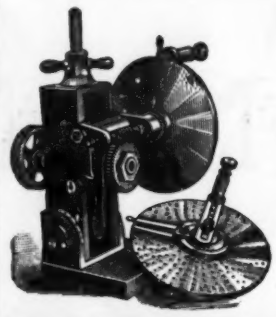

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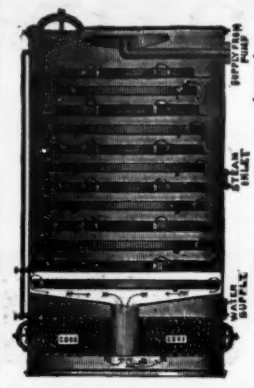

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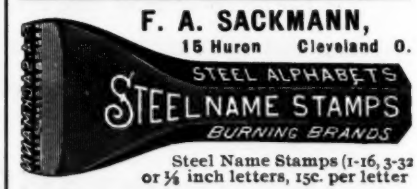

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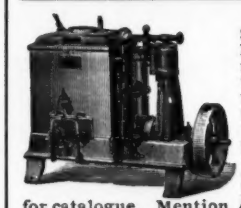

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LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@ 23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

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DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $20 50@21 00; Lake Superior (coke) Bessemer, $20 00@20 50; Katahdin (Maine charcoal), $24 00 @25 00; Lake Superior Coke, Foundry, all ore, $19 25@20 75; Lake Superior Coke, Foundry Cinder Mixed, $00 00@00 00; Standard Ohio Black Band, $00 00@00 00; Southern No. 1, $17 00@17 50; Southern Gray Forge, $15 25@ 15 50; Jackson County (Ohio) Silvery, $19 00@ 19 50; Old Car Wheel, $00 00@00 00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 75@ 15 25; Southern Coke No. 2 Foundry $14 25@ 14 75; Southern Coke No. 3 Foundry $13 75@ 14 25; Grey Forge, $13 25@13 75; Southern Coke Silver Grey, $14 00@15 00; Southern Charcoal No. 1 Foundry, $17 50@18 50; Southern Car Wheel, Standard brands, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 50@17 75; No. 2 Foundry, $16 50@16 75; Grey Forge, $15 50@15 75; White and Mottled, $14 50@14 75; Warm Blast Charcoal, $19 00@22 00; Cold Blast Charcoal $23 00 @29 00; Bessemer, $19 00@19 25.

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1½ to 4 by ⅜ to 1 inch	1 95
4½ to 6 by ⅜ to 1 inch	2 05
1¾ to 6 by 1⅜ to 2 inch	2 35
1¼ & 1¾ by ⅜ to ¾ inch	2 05
1 & 1¼ by ⅜ to ¾ inch	2 15
⅛, ¼ and ⅜ by ⅜ to ⅝ inch	2 35

Round and Square.

1 to 1⅜ inch	1 95
2 to 2⅜ inch	2 15
2¼ to 3¼ inch	2 45
3⅜ to 4 inch	2 95
4⅛ to 4½ inch	3 45
4¼ to 5 inch	3 65

Oval.

⅜ to 1¼ inch	2 35
⅜ to ¾ inch	2 55
½	2 75
⅝	3 15

Half Oval and Half Round.

1½ to 3 inch	3 95
⅜ to 1¼ inch	2 65
⅜ to ¾ inch	3 25
½	3 45
⅝	4 95

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 15
1 to 1¾ by ¼ and 5-16 inch	2 25
¼ to ⅜ by ¼ and 5-16 inch	2 45
⅛ to ⅜ by ¼ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1¼, Nos. 13 to 15	2 95
15-16, 1 and 1¼, Nos. 16 to 18	3 05
15-16, 1 and 1¼, Nos. 19 and 20	3 15
15-16, 1 and 1¼, No. 21	3 25
15-16, 1 and 1¼, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 35
1¼ to 6 by Nos. 11 and 12	2 45
1 to 1¾ by ⅛ to 3-16 in	2 55
1 to 1¾ by Nos. 11 and 12	2 65
⅞ and 13-16 by ⅛ to 3-16 in	2 85
⅞ and 13-16 by Nos. 11 and 12	2 95
¾ and 11-16 by ⅛ to 3-16 in	3 15
¾ and 11-16 by Nos. 11 and 12	3 25
⅝ and 9-16 by ⅛ to 3-16 in	3 45
⅝ and 9-16 by Nos. 11 and 12	3 55
½ by ⅛ to 3-16 in	3 75
½ by Nos. 11 and 12	3 85

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12	2 95
⅛ inch, " " " 13 and 14	3 15
¼ inch, " " " 11 and 12	3 25
¼ inch, " " " 13 and 14	3 45

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅛c "
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1 to 2 in. inclusive	09
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3¼ to 4 in	11
⅜ to 11-16 and 4½	10¼
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3-6 in	14

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2 to 9-16 wide by 2 to ⅛ thick	9

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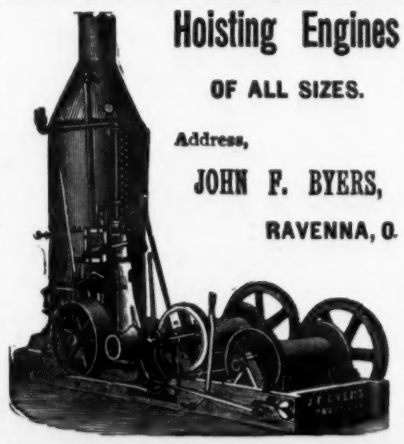

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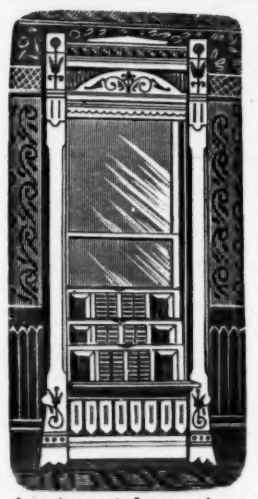

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Presenting best methods and original rules for obtaining good, sound, clean castings, and giving detailed description for making moulds requiring skill and experience.

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Cleveland Printing & Publishing Co.,

CLEVELAND, O.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¼

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard.dis 60&10
Shultz Raw Hide Leather Belting, single.....dis 40
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅛".....dis 50&10
Morse Taper and Straight shank Larger than 1⅛".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to No. 54 to Flour, 46 gr.	150. gr.	C. F. F.	FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@5 &5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3½	3¼
Hexagon	15½	11½	8¼	6	5¼	5¼	5
Washers	9	8	7	5	4½	4¼	4¼

In lots less than 100 lbs, ₩ lb add ¼c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@24
Vegetable Rubber.....₩ lb 18

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

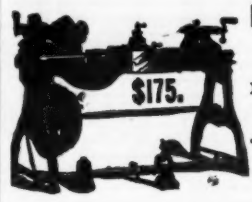
Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40



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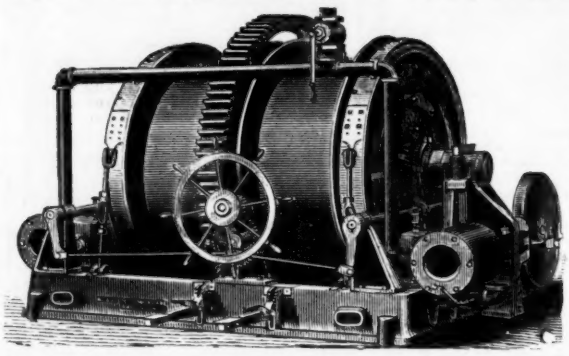

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CLEVELAND, O.
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IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
DUPLICATE WORK A SPECIALTY

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To Metropolitan National Bank Chicago
J. H. Williams

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CHAIN BELTING,

MADE IN ALL SIZES OF
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DESIGNED FOR
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Conveyors,
Drive Belts, etc.

For handling materials of all kinds.

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who knows its merits, because it is

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Who keep abreast with the times. None genuine without this trade-mark. See price list elsewhere. Send for catalogue, etc.

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And ELECTROTYPE FOUNDRY,
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OIL ALWAYS BELOW BURNERS---BY USING OUR SYSTEM.
OUR SYSTEM IS INSURABLE IN ALL INSURANCE COMPANIES.
WE GUARANTEE INSURANCE WHEN PLANT IS INSTALLED ACCORDING TO OUR SPECIFICATIONS.

THE AERATED FUEL CO.,

425 MAIN STREET, SPRINGFIELD, MASS.

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HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 7c&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 7c&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 7c&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 7c&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 7c&5

Chains.

Revised List.

Trace, 6½-10-2.....℔ pair 1.03 }
Trace, 6½-10-3.....℔ pair .92 } .....50&10
Trace, 7-10-2.....℔ pair 1.11 }
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ 15½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 25&10
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@⅄...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

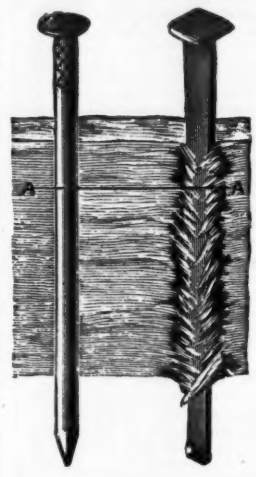
Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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MANUFACTURERS OF
HAND-CUT FILES AND RASPS.
EQUAL TO THE BEST ENGLISH FILE
46 & 48 COLUMBUS STREET

Cleveland, O., Oct. 26, 1889. 18

Clev Printing & Publishing Co.

City.

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Replying to your inquiry as to our opinion of The Iron Trade Review, will say that we have received more benefit from our advertisement in your paper than any other we have advertised in and fully believe we have been repaid for our adver tisement.

We heartily recommend this paper to all manufacturers who are seeking for a good business paper for advertising.

Respectfully yours.

Industry File Works.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks.

PAGE.

Aluminum—
Cowles Electric Smelting & Aluminum Co., Cleveland..... 16

Bath Tubs—
*Michigan Bath Tub Co.. Homer, Mich.... —
‡Instantanous Water Heating Co., Chicago, Ill..... —
Day Mfg. Co., Detroit, Mich'..... 16

Bolts and Bolt Machinery—
Upson Nut Co., Cleveland..... 20

Belt Holders—
*W. R. Santley & Co., Wellington, O..... —

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Pickands, Mather & Co., Cleveland....17 & 20
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*Copeland & Bacon, New York..... 24

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Webster, Camp, & Lane Machine Co., Akron, O..... 20

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Parkin & Bosworth, Cleveland.....20 & 24
Garvin Machine Co., New York..... 16
C. H. Presley & Co., Cleveland, O..... 16

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Van Duzen & Tift, Cincinnati, O..... 16

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Ault & Wiborg, Cincinnati, O..... 14

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Iron Clad Paint Co., Cleveland, O..... 16

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Harrington & King Perforating Co., Chicago, Ill..... 13

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Ohio Pulley & Machine Co., Warren, O.... 14

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Totten & Hogg Iron & Steel Foundry Co., Pittsburgh, Pa..... 24

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Gum Elastic Roofing Co., New York..... 14

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Time Tables, Etc..... 21

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Peter Gerlach & Co., Cleveland..... 14

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*Curtis Regulator Co., Boston, Mass..... 13
Detroit Heating & Lighting Co., Detroit, Mich..... 13

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn..... 14

Steel Stamps and Stencils—
J. H. Fleharty & Co.. Cleveland..... 20
F. A. Sackman, Cleveland, O..... 16

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Cleveland Rolling Mill Co., Cleveland..... 17

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Chester Steel Casting Co., Philadelphia, Pa..... 23

Sheet Steel—
Standard Iron Co., Bridgeport, O..... 23

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Avery Stamping Co., Cleveland..... 16

Stokers—
Brightman Stoker Co., Cleveland..... 22

Tinning Steel, Etc.
Avery Stamping Co., Cleveland..... 16

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Cleveland Twist Drill Co., Cleveland..... 24

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Central Iron & Steel Co., Brazil, Ind..... 23

Tackle Blocks—
Fulton Iron & Engine Works, Detroit, Mich..... 24

Type Founders—
Franklin Type Foundry, Cincinnati, O... 18

Window Blinds—
Hartman & Durstine, Wooster, O..... 17

Wire Goods—
*F. Powell & Co., Toledo, O..... 24

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John Adt & Son, New Haven, Conn..... 16

Wire Nails—
Salem Wire Nail Co , Salem O..... 19

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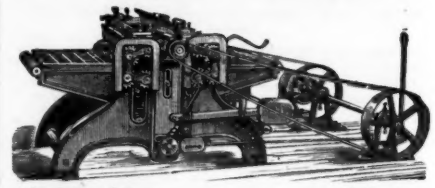

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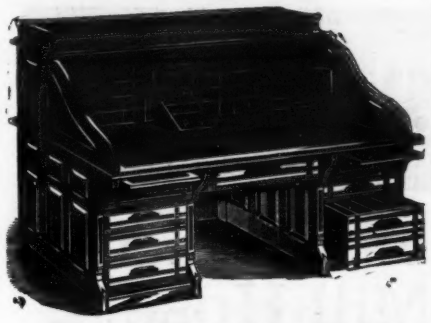

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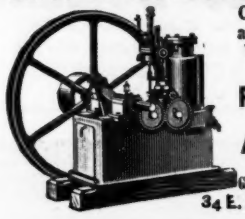

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	Arrive.	Depart.
N. Y. & Pitts. Express.....	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt. Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

d Daily. Other trains except Sunday.
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PICTURESQUE ROUTE
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No. 70, Pittsburgh Accom.....	*11 25 a m
No. 64, New York & Pitts. Limited...	* 2 50 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitssburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No, 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

*Daily. †Daily, except Sunday.

Baggage checked through to all points East.

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L. P. FARMER, Gen. Pass. Agt., New York
W. C. RINEARSON, Ass't G. P. A., Cleveland, O.
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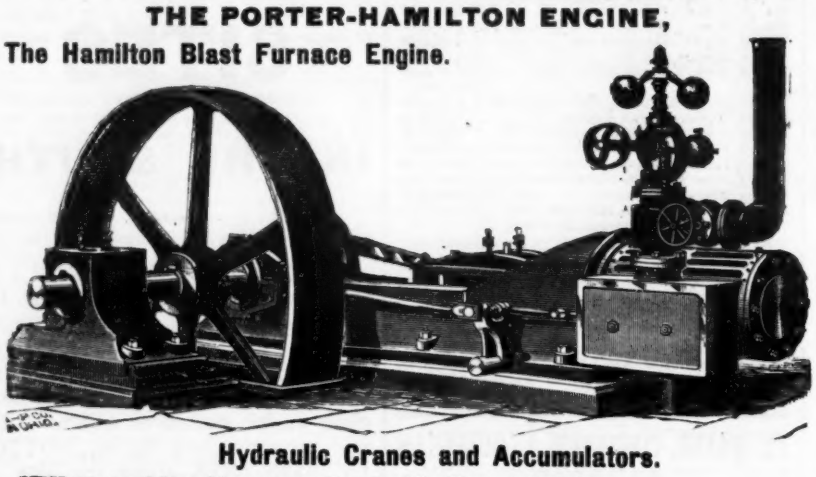

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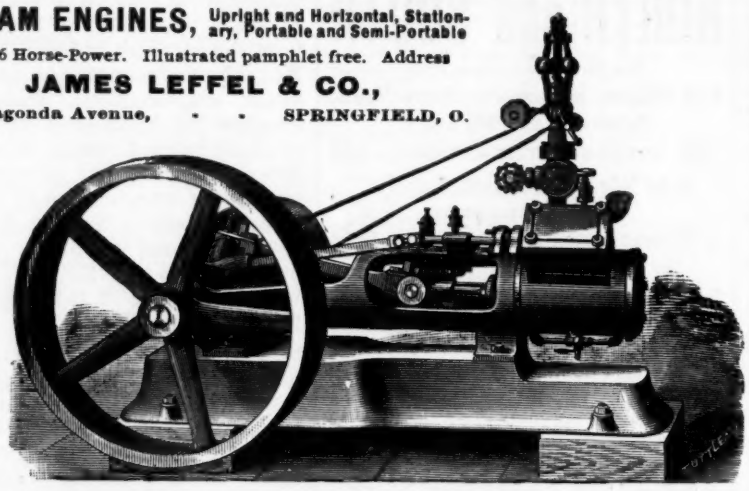

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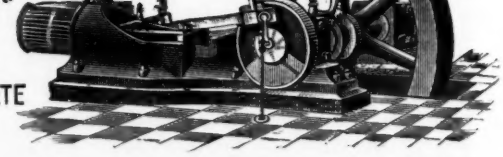

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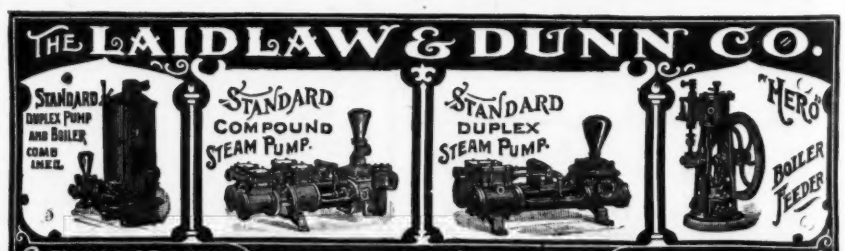

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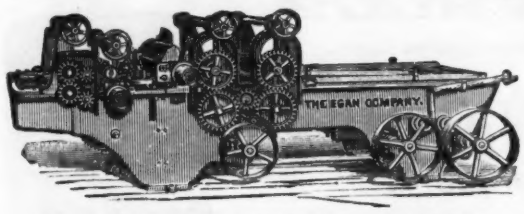

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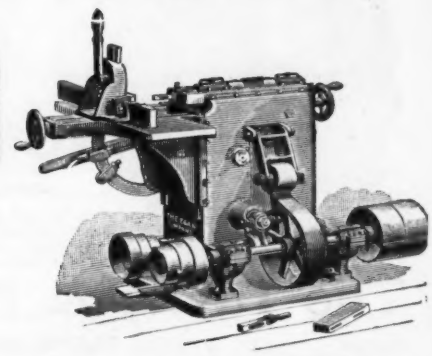

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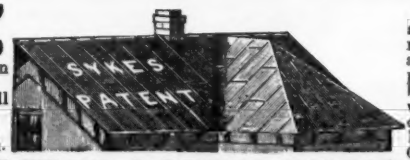

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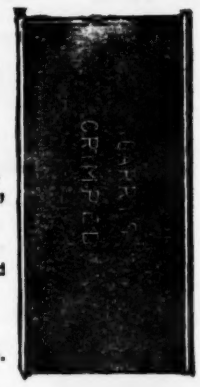

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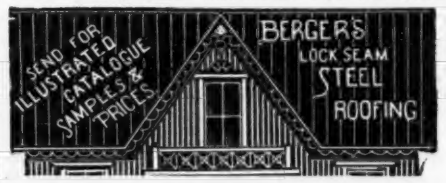

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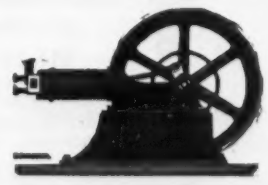

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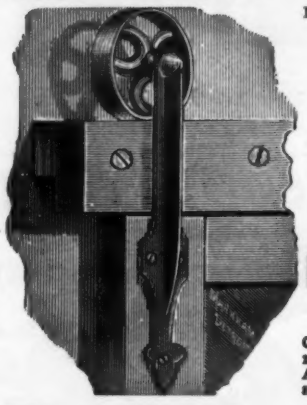

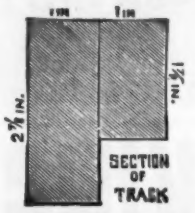

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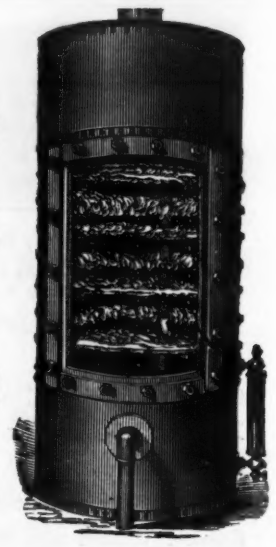

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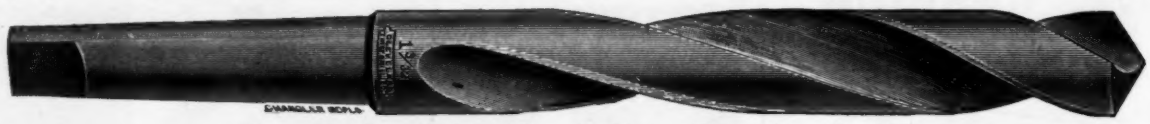

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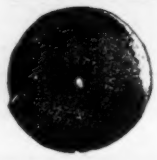

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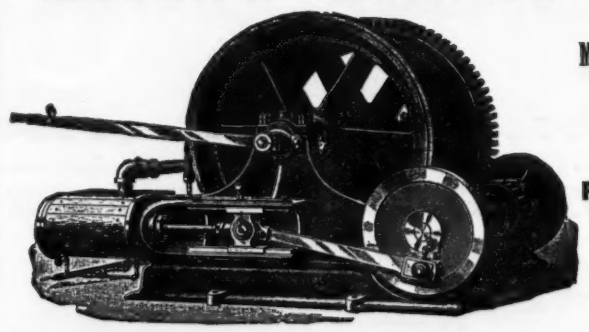

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